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QUEENSLAND AGRICULTURAL JOURNAL

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PART 5.

Event and Comment.

Anzac.

THAT the significance of Anzac Day is not dwindling with the passing of the years was evident in the Commonwealth-wide commemoration of the day and its deeds on the sixteenth anniversary on 25th April.

No chapter in the history of Australia—much less than the chapter that opened on the morning of the first Anzac Day—is without its importance in the history of the Pacific and of the world. The struggle that opened on 4th August, 1914, was a powerful agency in moulding the people of Australia and New Zealand. The causes of the war need not be dwelt on. To Australians it was in the nature of a crusade. The faith which upheld the nations fighting for human liberty was not more sound than among the people of Australia and New Zealand. All petty local differences were buried. Australia emerged a truly united nation.

Gallipoli cost us more than 10,000 men whom we could not afford to lose. Yet with their lives they purchased a tradition beyond human power to appraise and set for all time a standard for Australian youth. In the deeds done that day they not only showed the world what sort of man the Australian is, but also set the standard for every man who afterwards enlisted. The men who landed and died on Gallipoli made the Digger what he was. They died in the belief that they were fighting for a just cause—a cause in which was bound up the whole destiny of Australia. There is an urgent duty resting on every one of us, and that is to keep green the memory of the men of Anzac. Human memory is short. New interests and new problems are, with some at least, already crowding out even the recollection of the greatest deeds in our history. There is nothing we need more

than to keep alive in the coming years the patriotism—the genuine patriotism—that passed through our generation in the fateful years of war like fire glowing in molten steel.

As the years are passing there is gathering around the name of "Anzac" a great tradition, and it is for the newer generation that knows nothing about the tragedy of war to keep fresh the grace of remembrance. The patriotism of the dead will glow in the hearts of the living. We have sometimes left the great things—real patriotism, reverence, and gratitude—the big things of life, to chance. We cannot leave them to chance any longer, and the reverential commemoration by the whole nation on the Anzac anniversary may be accepted as overwhelming evidence of that determination. Let us discharge our debt to the dead by our charity for the living. Only by active service to the living can there be a true appreciation of those who died that we might live. We have war responsibilities to settle, but these are far outweighed by the peace opportunities that present themselves. What we want to foster is a broadminded, tolerant, co-operative spirit—the spirit of Anzac, the spirit that made the A.I.F. In the light of our brief history, in the light of our history since 1914, and remembering the men who made it, Australians will never lend a willing ear to the counsels of incompetence or despair.

All Australia's energy is needed now to build the Australia for which Australians fought, to build her into the nation she ought to be, the nation that her bravest sons hoped to secure by their sacrifice—their great sacrifice of radiant youth and life which they offered freely on the altar of human liberty.

Protection of Bird and Plant Life—Vandals of the Bushlands.

WHOLESALE slaughter in the suburban reaches of the Brisbane River of birds that have been given protection by the Government is to be countered with drastic action by the Department of Agriculture and Stock. Youths armed with pea-rifles have wrought havoc among native birds that have proved of immense help to the community. Magpies and butcher-birds by the dozen have been shot and the bodies tossed into gullies or the river, and these birds are great killers of insect pests. Especially in the Chelmer district and around Mount Crosby has the slaughter been going on, and the authorities intend to punish the offenders severely. It is likely that the campaign will be extended. Experience has proved that, particularly in the North, foreigners have no conception at all of the value of birds to the farming community. Kookaburras and ibises especially have suffered. It is declared that a kookaburra dare not laugh lest he go into the stewpot. The Department has appointed a small army of honorary rangers in various divisions of the State. They are provided with cards of authority, and are doing good work. Spoliation of bird life is not the only vandalism that is prevalent. During last year's session of Parliament there was one Bill which members of every shade of political opinion warmly supported. The measure was called the Native Plants Protection Bill, and it gave wide powers for the suppression of vandals of the bushlands. Its very title was an appeal to those who, without deliberate intent, thoughtlessly stripped the scrub and forest country of native shrubs and plants. The new legislation provided machinery for the declaration of sanctuaries; in fact, the Governor in Council was empowered to declare the whole State a sanctuary. It was thought, however, that those best able to suggest suitable areas would be the local authorities, and up and down the coast these were circularised and asked for suggestions. Only three have replied definitely favouring the scheme. They are the Pine Shire Council, Gayndah, and Mirani. The last-named is particularly anxious to preserve the beautiful

Eungella Plateau in its district from vandals. If the local authorities generally continue in their attitude of indifference it is possible that definite action will be taken from Brisbane to establish sanctuaries.

Preserving Native Bears.

HIS Excellency the Governor, Sir John Goodwin, speaking at the annual meeting of the National Parks Association in the course of the month, unhesitatingly pronounced the surprising wonders of the Hinchinbrook Channel to be among the most beautiful sights in the world. "As regards the flora and fauna," he said, "I think both of these are of the greatest importance. I had a letter only this morning from a well-known man in England. He is extremely interested in the fauna of Australia. He specially brought up the question of native bears which exist here and exist nowhere else in the world. They have tried several times to keep them in the zoological gardens in London, but have failed to keep them alive more than a few months. I think our only hope of preserving the fauna in Australia is by having big reserves in Queensland, where they will be adequately protected. There are many other animals, and also birds and flora, which I think it is of the utmost importance to preserve."

Kurrajong Seedlings.

IN our last issue it was announced that the Department had Kurrajong seedlings available in limited quantity for farmers and graziers desiring to plant and foster this very useful shade and fodder tree. So great was the demand that within a short time the supply of seedlings was exhausted. Each request was dealt with fairly in order of application, and the Department regrets its inability at present to comply with the many since received.

Tractor School at Gatton.

ONE phase of the activities of the Queensland Agricultural High School and College at Gatton covers periodical schools of instruction for farmers in order that they may have the benefit of an intense course of training in one or other of the several branches of husbandry. That the system is appreciated is obvious by the fact that every course has a full complement of students. The fees are nominal and are only imposed to cover essentials. Experts are in attendance, and the courses are intensely practical. The last course to be completed was the Eighth Tractor School which was in every way successful. Professor Murray, of the Queensland University, who is also Principal of the College, by the development of this fine idea has done and is doing yeoman service to primary industry in Queensland. The enrolment for the school just ended numbered seventy-two, mostly young men, which is evidence of the popularity of this form of college extension work. The farmers attending the school were intensely interested in their work. They came from all parts of the State, some from North Queensland, over a thousand miles away. Most of them, however, were from the broad wheatlands of large acreages where furrows stretch out to the far horizon. The aim of the College in inaugurating the tractor school was not to influence machinery sales. Some of the farmer students already operate tractors on their holdings; others had reached the stage where the advantages of the tractor had been forced upon their consideration, and they required complete information as to the economy of mechanical power before going to the expense of a large capital outlay. The College has made it its business to give these men the information and instruction they want, and it is doing its job thoroughly.

THE QUEENSLAND SUGAR INDUSTRY.

By H. T. EASTERBY, Director, Bureau of Sugar Experiment Stations.

PART XIV.

(c) Mills and Milling Work (continued).

PROCEEDING with the early sugar mills in a northerly direction up the coast after leaving Bundaberg, Isis, and Yandaran, we find there was a mill situated at Yeppoon. This mill, I understand, had the name of "Farnborough," and was in the 'nineties being operated by Mr. R. Armstrong. I believe the mill commenced crushing about 1884, and the cane required to make a ton of raw sugar of 88 net titre was $8\frac{1}{2}$ tons. The price paid for cane to the farmers was 12s. per ton, at which price it was stated some farmers did very well. Mr. Armstrong ceased operations when (as he said in evidence before the Central Sugar Mills Commission of 1911) the Commonwealth Government took away his kanakas, as he considered he could not grow cane by white labour. Most of the mill machinery was subsequently sold. There was also a mill near Rockhampton at Alton Downs, known as the Pandora Mill. This was running in the early 'eighties for a while, but apparently the mill was unsuitable and lack of water compelled its closure eventually. As far as I can ascertain these were the only two mills between the districts of Bundaberg and Mackay.

What was known for many years as the "Sugaropolis" of Queensland—viz., Mackay—possessed a large number of mills in the earlier days, though not so many as Bundaberg. The Mackay mills, however, for the most part, were larger. The following is a list of the old Mackay mills as far as I know. I am indebted to Mr. Wm. Robertson, formerly an old millowner himself at Mackay, for the names of the owners:—

Mill.	Name of Owner.
Alexandra	Melbourne-Mackay Sugar Company
Ashburton	John Spiller
Barrie	D. Jack
Beaconsfield	A. Henderson
Branscombe	Martin and Long
Balmoral	W. Hyne and Company
Casada	Donaldson Bros.
Cedars	M. Hume Black
Coningsby	John S. Avery
Dumbleton	Lloyd and Walker
Farleigh	Sir John Lawes
Foulden	F. T. Amherst
Habana	Long and Robertson
Homebush	Colonial Sugar Refining Company
Inverness	Macdonald Bros.
Lorne	Robinson Bros.
Marian	George Smith and others
Meadowlands	Fitzgerald and others, afterwards W. Hyne
Miclere	Carrol and Avery
Mount Pleasant	W. S. Adams
Nebia	Gausson and Fitzsimmons
Ninderoo	Paget Bros.
North Eton	Co-operative Company
Palms	John Ewen Davidson
Palmyra	H. McCready
*Peri	T. H. Fitzgerald
Pioneer	John Spiller

* This mill was erected but never crushed.

Mill.				Name of Owner.
Plane Creek	..	..	..	Co-operative Company
Pleystowe	..	..	..	Hewett and Romilly
Racecourse	..	..	..	Co-operative Company
Richmond	..	..	..	McBryde and Finlayson
River Estate	..	..	..	Long Bros.
Robbs Mill	..	..	..	Robb
Te Kowai	..	..	..	Davidson and Fitzgerald
Victoria (near Eton)	..	..	..	Melbourne Company

Cattle Creek Mill did not commence crushing till about 1906.

Of the above mills only seven are now crushing—namely, Farleigh, Racecourse, Pleystowe, Marian, Cattle Creek, North Eton, and Plane Creek. These seven mills, however, turn out far more sugar than was ever dreamt of when the larger number was crushing. The Pleystowe and Marian Mills were crushing as proprietary mills before they became Central mills.

In the early days Ninderoo manufactured a white sugar and took prizes in England for their whites and Demerara crystals.

From an illustration of some of the early sugar mills in Mackay the following particulars have been taken:—

Melbourne-Mackay Sugar Company Limited.

Palms Mill.—Total area 8,094 acres, situated on the Pioneer River, 7 miles from Port Mackay with railway running through; 5,000 acres cultivable; 3,042 at present under cultivation; total capacity working day and night 5,000 to 6,000 tons of sugar in the crop season; average output during the ten years prior to 1896—2,418 tons. Labour employed—White men, 81; coloured, 300; draught horses, 230.

Habana Plantation.—Proprietors—Messrs. Long and Robertson, commenced on single proprietary system 1882; in 1884 commenced letting to farmers; twenty-six farmers supplying in 1896. The area was 7,174 acres of freehold. Area under cane for 1896—1,300 acres. Mill capacity—4,000 tons of sugar per season. Seventeen miles of permanent tramway and 430 tram trucks. Population in 1881, 7 adults; in 1886, 630 adults.

Ninderoo Mill.—Distant 8 miles from Mackay; owned by Paget Brothers. Area, 2,050 acres. Area under cultivation on plantation, 1,050 acres. Number of white employees and kanakas, 220. Farmers numbering twenty and cultivating 900 acres supplied cane to mill from estate and adjoining properties; 2,000 acres scrub and forest land still available for farming within easy distance of mill. Capacity of mill, 4,000 tons of sugar. Double crushing and maceration; triple effect evaporating plant.

Farleigh Plantation (embracing Foulden, Pioneer and Ashburton Estate).—Owners, J. B. Lawes, Bart.; manager, F. W. Bolton; area, 9,000 acres. Capacity of mill, 7,000 tons of sugar. Treble crushing system with triple effects; vacuum pan capacity, 20 tons. Boiler power, 750 horse-power. Sugar house, 50 ft. by 150 ft. The number of farmers growing cane for the mill increasing. Average white labour employed, 70; coloured, 300. Present tramlines—15 miles, worked by locomotives; electric light and telephone used. Mission house for kanakas and church on plantation.

Pleystowe Central Mill Company, Limited, Mackay.—Started in 1894; first crushing in 1895—715 tons of sugar. Sixty farmers sending

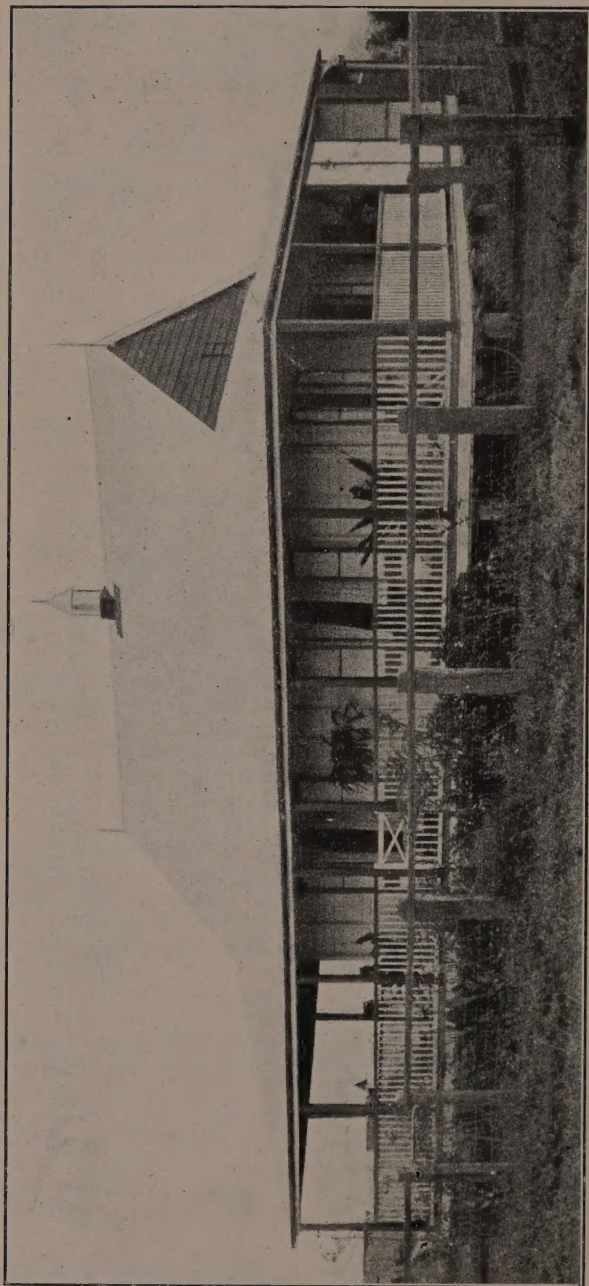


PLATE 77.

Mr. Armstrong, the late Dame Nellie Melba's husband, was one of the first managers of the old Marian Sugar Mill, in the Mackay district. The house depicted above was built for Melba and her husband. It has since been shifted to another site and is occupied by the Chief Engineer (Mr. Guilfoil), and the house of the present manager (Mr. O'Neill) is erected on the original site of Melba's home. Mr. Dave Coyne, one of the oldest pioneers of Marian, remembers Melba in the early days of Marian.—(Taken from the "North Queensland Register.")

cane to mill in 1896. Mill capacity, 7,000 tons per season; area available, 15,000 acres. Two hundred and sixty trucks and 9 miles of tramway.

Mr. William Robertson, an old pioneer of the Mackay district, and who was a partner of the firm of Long and Robertson, has kindly supplied the following additional details:—"Two other small mills may be added to the Mackay list of the early 'seventies:—

"1. Owner, James Robb.—Small primitive mill, open-pan boiling. Molasses separated by drainage through perforated vats—possibly old West Indian process; I think it worked only one season. Situated at the Lagoons, on or near the site now occupied by the Mackay Experiment Station; nothing to do with Balmoral Mill near the main road on the other side of the same Lagoons.

"2. Owner, William Russell.—Small horse-power mill; turned out limited quantity of ration sugar; worked perhaps for two seasons. Would not pay; so the mill was closed. Situation (as nearly as I can remember) short distance to the eastward, not far from the junction of Nebo and Homebush roads.

"'Norbrook' I cannot place. I remember a man, John Emanuel Paine, who started to erect a small mill, but he sold before completing. Possibly he sold to Carroll and Avery; if so, it would become the 'Miclere' mill; that is in the list. Paine's place may have been called 'Norbrook,' but I cannot remember."

In connection with many of the early Mackay sugar mills, a valuation was made in 1890 by Mr. George Smith, a well-known Mackay resident at that time, which was furnished in connection with the movement that the Government should take the mills over at that period:—

	£
River Estate	100,000
Meadowlands	28,000
Foulden and Farleigh	150,000
Te Kowai	33,000
Pioneer and Ashburton	150,000
Alexandra	30,000
Dumbleton	10,000
Lorne	5,000
Carroll and Avery	10,000
Casada	5,000
Coningsby	16,000
Palmyra	15,000
Nebia	28,000
Barrie	17,000
Richmond	12,000
Homebush	350,000
Beaconsfield	12,000
Victoria	30,000
The Cedars	17,000
Marian	27,000
Inverness	12,000
Pleystowe	47,000
Habana	150,000
Racecourse	22,000
Ninderoo	80,000
Palms	50,000
Balmoral	6,000

Going on further North the next mill was the Central Sugar Mill erected at Proserpine about 1896, and which commenced crushing in the year 1897. This mill is still operating and was, and is, the only one in the Proserpine area.

The Lower Burdekin district at one time boasted of the following mills, viz. :—

Mill.				Name of Owner.
Airdmillan	..	..	..	A. C. Macmillan
Seaforth	..	..	..	James McKenzie
Drynie	..	..	..	Colin Munro
Kalamia	..	..	..	Charles and John Young
Pioneer	..	..	..	Drysdale Bros.

The Inkerman Mill was not erected till 1913 and the Invieta Mill at Giru was originally the Invieta Mill, near Avondale, in the Bundaberg district, from which place it was transferred in the year 1920, and had its first crushing in its new location in 1921. I understand that Drynie Mill was transferred to Bundaberg at a much earlier date, and became Mon Repos, afterwards Qunaba; so this exchange of mills was a kind of *quid pro quo* between the two districts.

Due I suppose to the difficulty of opening up the more Northern latitudes for sugar growing, the number of mills in the areas above Townsville were much less than in Bundaberg and Mackay. On the Herbert River there were five mills in the early days. Of these Gairloch Mill machinery was supposed to have been transferred from Captain Whish's Caboolture mill as early as 1871, and taken to the Herbert River in the steamer "Dawn." The Gairloch Mill was then owned by Mr. MacKenzie, who, I understand, afterwards sold same to Fanning and Nankwell. The following were the Herbert River mills :—

Mill.				Name of Owner.
Hamleigh	..	..	..	A. S. Cowley
Gairloch	..	..	..	Mackenzie, afterwards Fanning and Nankwell
Ripple Creek	..	..	..	Wood Bros. and Boyd
Macknade	..	..	..	Neames Bros., afterwards Fanning and Nankwell
Victoria	..	..	..	C.S.R. Company

The C.S.R. Company later took over the Macknade Mill; Hamleigh and Gairloch finished many years ago. Ripple Creek carried on till about 1910, I fancy, when it too closed down, the cane going to Macknade.

The Johnstone River district was first opened up for sugar-growing in 1880, and the jubilee of that event was celebrated in Innisfail in April of last year. The Johnstone River itself was discovered in 1873 by Sub-Inspector Johnstone, from whom the river was named. There was no settlement beyond occasional timber-getters till 1880.

Thomas Henry Fitzgerald who was one of the pioneers of the sugar industry in the Mackay district became interested in the Johnstone River area and first visited it in 1879, and he with others applied for eight selections of 1,280 acres each, and later started the Innisfail plantation. The first sod for the Innisfail Sugar Mill was turned on 5th August, 1881, and the crushing season was commenced on 9th November of that year and finished on 9th January, 1882. A report shows that 40 tons of sugar were manufactured.

In a booklet celebrating the cane jubilee of Innisfail full credit is given to the late Mr. Fitzgerald for his pioneering work. It is stated the influence of his enterprise can hardly be over-estimated.

At first there was an immense amount of prejudice against the Johnstone River locality. It was known that the place was at that period infested by fevers and pests. The position was isolated, and the land covered by the most difficult scrubs and swamps. Floods had to be feared,

and the heavy rainfall was always a great hindrance to progress; then came the proposal of Griffith to wipe out the black labour. As a result sugar-growing was expected to collapse, and a big proposition at the Tully was abandoned by Tyson.

The Innisfail Sugar Mill was erected on what was known as the Innisfail Estate, which was situate on the side of the river opposite to the town. Originally Mr. Fitzgerald also owned the land on the spot where the township now stands, but he exchanged it for land on the North Johnstone River in order to allow the town to be established. When the Innisfail mill closed down, Mr. Fitzgerald supplied cane to the Goondi mill. The Goondi Sugar Mill is stated to have commenced operations in 1883, and there was also a Queensland Sugar Company and sugar mill called "Innishowen," the old Queensland Estate, being on the Mourilyan side of the river. Dr. O'Doherty, Ryan, Fitzgerald, and G. W. Gray were interested in this mill, which commenced crushing about 1883. The machinery was stated to have been French. The date of the erection of the Mourilyan Sugar Mill is given as 1882, the first crushing taking place in 1884. The mill was first owned by the Mourilyan Sugar Company, in which Mr. Smellie was interested, and passed in to the hands of the Mourilyan Syndicate in 1907. In 1914 the property was taken over by the Australian Sugar Company, Limited, the present owners. The manager of the mill in 1882 was F. E. Nash.

The mills in the Innisfail district, therefore, were:—

Mill.	Owner of Mill.
Innisfail	T. H. Fitzgerald
Queensland Estate (Innishowen)	O'Doherty, Fitzgerald, Gray, and others
Goondi	C.S.R. Company
Mourilyan	Mourilyan Sugar Company

Considerably later the South Johnstone Central Mill was erected, and this mill, Mourilyan and Goondi, are the ones which are crushing to-day. The Tully Mill between Cardwell and Innisfail is also of recent date.

We now come to the mills erected at Cairns. The first mill at Cairns was stated to be the Pioneer at Hop Wah Plantation. The following account of the opening of this mill is given in the Jubilee Number of the "Cairns Post":—

"Opening of Pioneer Mill.

"At the official opening of the Pioneer Mill, a party consisting of Messrs. Clayton, Hill, Charles Adams (first manager of Goondi), R. T. Hartley, Captain Mylchreest, and his daughter, were present. The latter put the first cane through the rollers and Mrs. Andrew Leon christened the mill "Pioneer." Mr. Geddes was Engineer in Charge, and erected the mill for Walkers Limited; he continued at the mill, but after some time contracted a fever and died. The Hop Wah Mill was situate between the Four-mile Hotel and Cairns. The mill, which was managed by a Chinese named Leon, was owned by a company. Eventually the plantation was purchased by a man in Charters Towers, whereupon the mill was dismantled."

It was also stated in the same jubilee number that, at a meeting of shareholders in the Bellenden Ker Central Mill Company, the chairman announced that a site had been chosen for a mill. Those present were Messrs. W. H. Swallow (chairman), G. R. Mayers, W. J. Munro, and others. This mill apparently was never erected.

The next mill at Cairns was the Pyramid, and in the course of a description of the Pyramid Plantation, a writer in the "Queenslander" about 1884, said:—

"The Pyramid Plantation, owned by Messrs. J. B. Loridan and Company, is situated in a broad valley between two mountain ranges. Four hundred acres were under cane at the time of my visit, and more was being cleared. The dwelling-house of the manager and part proprietor is very pleasantly situated on a knoll midway between the ranges, and on the north can be seen the rolling waters of the Mulgrave, while on the south is the rippling water of a pretty babbling brook. Further up the hills, following the course of this brook, can be seen from certain points, a waterfall, and as this priceless boon insures a perennial supply, Mr. Loridan selected the land to include it. Mr. Loridan and his family have come from Sandhurst (Bendigo) in Victoria, fully equipped with mosquito nets and other essentials for comfort, but mosquitoes are unknown here, and the nets are packed away as lumber. Dwellers in Southern Queensland have little idea of what the climate northward is. The days are always hot, so much so that when work is attempted between the rows of standing cane, a profuse perspiration is forced from every pore.

"Description of Mill Plant."

"The Pyramid Estate contains over 5,000 acres of scrub land of volcanic origin, and was very rich in organic matter in all stages of decomposition. When the plantation was started, the intention was to extend operations, but since the supply of labour had been interfered with the proprietors have been compelled to limit their enterprise. They regret having gone so far as they have, for prospects are anything but assured, and but for the fact that a start had been made, and orders given in the Old Country for machinery, a complete stoppage would have taken place. The main portion of the crop of sugar-cane on this plantation consists of Rose Bamboo and Meera. Creole is grown here, but not in large quantities, and the general opinion is that the Creole and the Meera are identical. Cheribon and some other varieties, including several ribbons, are also under trial. The labour now on the plantation consists of 35 Europeans, 81 kanakas and 100 Chinese, and about 140 more kanakas are expected to arrive shortly. The kanakas are every where happy and contented, and appear to do their work as cheerfully as any other people. The Chinese are anything but reliable, and unless they are sharply overlooked, they will skulk and loaf frightfully and try in every way to take advantage of their employers. Much of the contract work in clearing off, burning off, and first planting is undertaken by these celestials, and only when thus dealt with can they be employed advantageously. Three hundred tons of machinery are already landed, and an equal quantity is to arrive. Manlove, Alliott, Fryer and Company, of Nottingham, are the makers of the machinery, which is equal to the manufacture of 10 tons of sugar every twelve hours. It consists of double crushing rollers, French double-bottom clarifier, filter press, triple effet, and vacuum pan, three multitubular boilers, 8 ft. in diameter, by 14 ft. long, with 136 tubes each, and separately up to 115 horse-power. A Godillot furnace is to be used to burn the megass as it comes green from the rollers—an appliance which has not yet been thoroughly tested in Northern Queensland. A sawmill is worked by steam, the engine being of 14 horse-power (by Robey) and which

works a vertical as well as several circular saws. The buildings erected for labourers are all that could be desired, being roomy, well ventilated, and evidently constructed with due consideration for the health, comfort and well being of those who occupy them. The European quarters are nearly a-quarter of a mile from the kanaka house, and form a comfortable block of buildings."

Later on a fire occurred at the Pyramid Mill which destroyed the buildings containing the boilers and the newly completed sugar mill, and also a storehouse attached to it. This, however, was rebuilt. Eventually the Pyramid Mill went the way of the small factory and ceased to crush.

The next mill to be erected was Hambledon, situate about 7 miles from Cairns. This was owned by Messrs. Swallow and Derham, of Melbourne, and was later on sold to the Colonial Sugar Refining Company who continue to operate same.

The last mill was the Mulgrave Central Mill. The company was formed in 1893 and registered in Brisbane on the twentieth day of April, 1895. The original company consisted of forty-four local farmers, who mortgaged their land to the Queensland Government under "*The Sugar Works Act of 1893 to 1911*," in order to secure advances for the building of the Mulgrave Central Mill and Tramways. The sum secured from the Government in this manner was £44,000.

The mill was built by Messrs. A. W. Smith and Co., of Glasgow, in 1896, and their contract price was £26,850, and the contractor's constructing engineer, Mr. Smart, ran the mill for the first season from October, 1896, to March, 1897, during which period 13,000 tons of cane passed through the rollers for a yield of 1,351 tons of sugar, equal to 10.1 tons of cane to a ton of sugar.

Proceeding to the Mossman (Port Douglas) district, I find there was a mill there in the old days known as Brie Brie. This stood on or near the farm now owned by Senator Crawford, and was the property of Mrs. Parker, somewhere about the year 1884. It was a 3-ton plant of an inexpensive kind combined with about 1,280 acres of land.

The present Mossman Central Mill was erected about the year 1896, and first crushed in 1897.

The most northerly mill in the early days was on the Bloomfield River. A large sum was expended on sugar machinery and cultivation, but without success. Subsequently the mill was sold to a Southern firm and transferred to Knockroe, near Childers. The original owner of the mill was named Bauer.

[TO BE CONTINUED].

If you like this issue of the Journal, kindly bring it under the notice of a neighbour who is not already a subscriber. To the man on the land it is free. All that he is asked to do is to complete the Order Form on another page and send it to the Under Secretary, Department of Agriculture and Stock, together with a shilling postal note, or its value in postage stamps, to cover postage for twelve months.

Bureau of Sugar Experiment Stations.

CANE PEST COMBAT AND CONTROL.

The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has received the following notes from Mr. E. Jarvis, Meringa Entomological Laboratory, near Cairns:—

HINTS REGARDING CANE GRUB CONTROL.

At the present time (April) we may expect to witness decided evidence of cane-grub injury. Preliminary signs are now to be seen in slight wilting of the heart-leaves, which losing their bright green appearance become of a pale sage colour; while the edges of the leaf blades curl inwards, assuming a tubular form. This is especially noticeable during warm days, and is soon followed by yellowing of the leaves, which in cases of severe grub attack rapidly turn brown and die.

The grubs of the notorious "greyback beetle" (*Lepidoderma albohirtum* Waterh.) are now in the third instar or stage of growth, and in most places have attained their full size (about 2 inches in length).

Whenever opportunity occurs these grubs should be collected from plough furrows, and either destroyed or given to fowls. Do not forget that every second grub collected would—if left in the soil—produce female beetles, each of which is able to deposit an average of twenty-seven eggs. This means that the number of beetles arising from an acre of such land (infested, say, at the rate of five grubs per stool) would, if allowed to breed the following year, be sufficient to destroy about thirteen acres of cane.

Feathered Friends of the Farmer.

I would again impress upon growers the value of our insect-eating birds. Any species noticed following the plough should be encouraged as much as possible. The common "Straw-necked ibis" is admitted by all to be the grower's best friend, and the grubs eaten in a few hours by only one of these birds probably represents considerably more than the value of a labourer's daily wage. In addition to devouring the grubs of beetles they eat great quantities of grasshoppers and crickets.

Fighting the Grasshopper Plague.

The present season has been marked by noteworthy outbreaks in the Babinda, Ingham, Innisfail, and other districts of the familiar "Yellow-winged Grasshopper" (*Locusta danica* L.). This insect, which is one of the recognised plague locusts, occurs in many other countries, causing at times considerable damage to miscellaneous crops. Its last appearance in North Queensland in plague form was during the year 1912, when the Springsure and Mossman districts suffered a formidable invasion of this pest.

SUGAR CANE PRICES BOARDS.

Members have been appointed to five Local Sugar Cane Prices Boards as follows:—

Marian Local Board—

Millowners' Representatives—A. J. Coyne and J. O'Neill.
Canegrowers' Representatives—H. R. J. Barenthien and E. C. Walz.
Chairman—M. Gallagher.

Mourilyan Local Board—

Millowners' Representatives—L. J. Duffy and R. Sloan.
Canegrowers' Representatives—E. R. Campbell and G. F. Hudson.
Chairman—A. R. Aitkin.

Plane Creek Local Board—

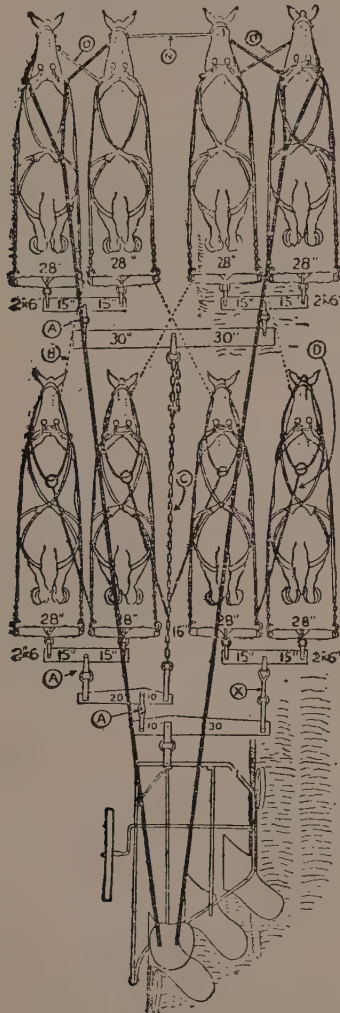
Millowners' Representatives—D. Greetham and A. Innes.
Canegrowers' Representatives—C. W. Davidson and P. McCowan.
Chairman—M. Gallagher.

Pleystowe Local Board—

Milowners' Representatives—R. Clarke and J. W. Inverarity.
 Canegrowers' Representatives—M. W. R. Bowman and C. McKinley.
 Chairman—M. Gallagher.

Racecourse Local Board—

Milowners' Representatives—J. M. Gibson and A. S. Hamilton.
 Canegrowers' Representatives—A. Turner and T. J. H. Whitecomb.
 Chairman—T. E. Dwyer.

MULTIPLE HITCHES.

The method that is used in America in hitching eight horses. Notice the simplicity of the method of handling. In making the double-trees the exact lengths given should be used so that the burden will be equally distributed.

THE KIDNEY WORM OF PIGS.

By F. H. S. ROBERTS, M.Sc., Veterinary Entomologist and Parasitologist.

Introduction.

THE pig, more so perhaps than any other animal, affords asylum to a large number of parasites, a circumstance readily explained by the diversity and frequent impurity of its food and the insanitary conditions under which it is generally maintained. No less than seventeen species of internal parasites have been recorded from this animal in Australia, and of these, in Queensland at all events, the kidney worm is the one that appears to be most frequently encountered. In a reference to this parasite, T. H. Johnston notes its appearance in this State as early as 1871, when pigs at Ipswich were reported infested. Since then its occurrence has been recorded in many localities, and at the present time the species is known in Queensland wherever pigs are raised, though district infestations vary to an extent dependent on the climatic and hygienic conditions of the district concerned. In certain areas its infestations have already reached serious proportions, and unless it is brought under control in the immediate future the losses sustained by those interested in the pork and bacon industries will become increasingly severe.

As with most pests the part of the research worker is played when he has worked out the important points in the biology of the pest under consideration and formulated measures by means of which it may be controlled. The application of these measures—the most important part of all—remains in the hands of the person more directly concerned because of the losses he is sustaining, in this case the farmer, and it is surely to his own benefit that such measures should be properly and most carefully carried out.

The object of these notes is to place before the pig breeders of Queensland some facts dealing with the kidney worm, its importance and control. It is hoped that there will not be any difficulty in understanding such of the technical words and phrases as are included. A definite attempt has been made to replace such technicalities by simpler phrases, but it must be remembered that, in dealing with anatomy and diseases, technical words are part and parcel of the subject, and no other words can be used to imply what is required. The œsophagus, for example, is that part of the digestive tract leading from the pharynx to the stomach, and no simpler term understandable to all could replace it.

Description of the Kidney Worm.

The kidney worm, *Stephanurus dentatus* Diesing (Plate 78, figs. 3 to 4a), has a very distinctive appearance, and once recognised could not possibly be confused with any other internal parasite infesting the pig. It is a stout, elongate worm, measuring up to 2 inches in length with a maximum breadth of about one-twelfth of an inch. In colour it is somewhat pinkish and conspicuously mottled, due to the folds of the dark intestine and whitish reproductive organs which are visible through the more or less transparent coloured skin. At the anterior end is a rather large mouth which leads into a thick walled, cup-shaped cavity, the buccal capsule, at the bottom of which six conspicuous, triangular teeth are situated, whilst around its margin about fifty tiny tooth-like structures are to be seen (Plate 78, fig. 5). The large triangular and

the tiny marginal teeth enable the parasite to bore through and infest the tissues it invades. Of the two sexes the male is the smaller, and whilst in the female the posterior end is provided with a short tail (Plate 78, fig. 7), in the male it is furnished with a wing-like appendage known as the bursa (Plate 78, fig. 6). This bursa is typical of the roundworm group to which the kidney worm belongs, the Strongyles, and is simply a membranous outgrowth supported by a system of rays.

Organs and Tissues Infested.

The popular names, "kidney or lard worm," are derived from the more conspicuous infestations of the kidney fat, the perirenal and periureteral tissues. Here the infestation consists of nodular or cyst-like formations distributed throughout the tissues and distended with pus and bunches of worms. In very heavy infestations, such as are usually found among old pigs, the parasites may be also seen embedded in the spleen, liver, pleura and sometimes the lungs, in the muscles of the lumbar and costal regions, in the diaphragm, and in the mesenteric tissues. Sometimes the kidneys themselves are invaded, and it frequently happens that the parasites may be picked up lying free in the body cavities, an indication of their migratory tendencies. It would therefore seem that kidney worm infestation, when allowed to run its course, tends to become a generalised rather than a localised condition, and that migration through the body cavities appears to be connected with the life cycle, the parasites wandering through the various tissues in an endeavour to reach the fatty tissues of the kidneys, which are more conducive to their mature development.

Pathological Lesions in the Infested Organs.

(1) The Liver.

The pathological changes in the liver following kidney worm attack are far more pronounced than in any of the other organs and tissues liable to infestation. As a rule the liver becomes much enlarged, and varies in colour from a pale mottled to a dark purple, the former indicating a heavy and continued infestation (Plate 80, figs. A and B). In cases of light infestation the dark colouration is relieved by one or more whitish specks scattered over the surface and usually situated towards the edges of the lobes. When sectioned it will be seen that these specks extend some little distance into the organ and usually contain a small cavity or tunnel in which a worm, surrounded by a dark semi-solid substance, may lie. The whitish appearance is due to the great enlargement of the connective tissue enclosing the liver lobules and the subsequent shrinkage and degeneration of the liver cells. In such a liver bunches of worms and degenerated tissue will be found occasionally in the larger blood vessels and bile ducts, causing almost complete blockages in these systems and bringing about a congested condition from which the dark colour of the organ is derived. A further cause of congestion is to be found in the more minute vessels, the presence of the worms resulting in some way or other in a thickening of their walls, a reduction in size of their lumina, and eventually in a complete stoppage. In cases of more severe infestation the pale mottled appearance is due to wholesale degeneration of the active liver substance and its replacement by fibrous tissue. Large areas of the liver may consist solely of this fibrous tissue in which worms and worm tracts abound. Occasionally large nodular and abscess-like formations are encountered distended with worms and pus.

tissue may become replaced, as in the liver, with fibrous tissue intermingled with worm tracts containing either worms or degenerated tissue.

Migration through the peritoneum and muscle tissues may bring about acute inflammation accompanied by pus formation.

Effect of Kidney Worm Disease on the Pig.

Generally speaking, the effect of a parasite upon its host is more or less dependent on five factors which may be enumerated as follows:—

1. The number of parasites present.
2. The part or parts of the host infested.
3. The nature of their food.
4. Their movements within the host.
5. The age of the host.

1. A single parasite usually causes so little inconvenience to its host that its presence is not suspected, whereas if numbers of a species are present serious disturbances in the health of the host may arise. This may be due to the appropriation of large amounts of nourishment by the numbers present, to the quantity of toxins produced by the parasites, and to the serious pathological changes in various organs and tissues resulting from heavy infestations. The kidney worm is no exception to the rule, and it is consequent on heavy invasions only that the parasite becomes conspicuous in its reactions towards the health of the host.

2. So far as the kidney worm is concerned this factor is intimately related with those under headings 3 and 4. A parasite may, for example, inhabit the digestive tract and do no appreciable harm, but if it should, in the course of its life cycle or as a result of any abnormal reaction, invade certain tissues, serious disorders may result. The kidney worm, if confined to the fatty tissues of the kidneys and ureters, may do a certain amount of harm, but its migrations through the body cavities involve the destruction of certain other tissues of the utmost importance to body health, thereby greatly increasing the disturbances to the health of the host. The kidney worm may therefore be placed among the more pathogenic parasites, for, instead of merely appropriating a proportion of the nourishment of the host, it feeds upon and destroys living tissues.

The diseased conditions exhibited by the infested liver, kidneys, and kidney fat, the several lymph glands and lungs, demonstrate what a severe and disastrous drain on the health and vitality of the pig kidney worm infestation may produce. Invasion of the liver results in the ultimate degeneration of the secreting cells and the formation of obstructions in the bile and blood systems. Such a condition means a much lessened secretion of bile, a secretion of the utmost importance in digestion, and, moreover, the little that is produced is prevented free deliverance to the digestive tract because of the obstructions in the vessels supplying it. Partial and complete blockages in the vessels of the blood system not only hinder the distribution of the pure arterial blood throughout the organ, but also delay the excretion of impurities.

The kidneys themselves, although infestation elsewhere in the pig may be fairly heavy, are rarely attacked; but, as they are the principal excreting glands in the body, any interference with their normal activities must lead to severe complications. The distended pelvis filled with pus and toxins, the thickened and nodular ureters, abscess formation,

and the replacement of the active excreting cells by useless fibrous tissue cannot but have a disastrous effect on the wellbeing of the infested animal.

Invasion of the renal, portal, and mesenteric lymph glands causes their ultimate degeneration, and, as their secretions are of vital importance to body growth and health, conditions resulting from their decreased activities are obviously harmful.

5. There are, as a rule, two stages in the life of the host when parasites appear to have more influence on its health—viz., during the periods of adolescence and old age. During the earlier stages of growth the organs and tissues are very tender and offer little resistance to the invading worms. In old age the susceptibility is increased as the reduced vitality of the animal gives not only a lessened ability to defend from attack, but also reduced activities and secretions of various glands, thus decreasing the capabilities of eliminating the parasites. Kidney worm disease, however, does not quite conform to the general rule, for, although it may play havoc among young pigs, it is more usual to find heavy infestations among old pigs. The disease appears to be cumulative, and for this reason is generally much more advanced in pigs which have been exposed to infestation for long periods, while in young pigs the infestations are, as a rule, light, as the periods of exposure are comparatively short.

Symptoms of Kidney Worm Disease.

Only heavy infestations are likely to give definite external symptoms. The inflammation of the renal tissues and abscess formation in the kidneys themselves produce an acute tenderness of the infested region, which may be detected by placing the hands on the loins and gently applying pressure. The invasion of the muscles adjacent to the kidney, aided, no doubt, by the accumulation of toxins, appears to affect the nerves traversing this region to the hind quarters, and a stiffness in the movements of the animal may be detected. Paralysis of the hind quarters is said to be the last stage in this interference. It should be mentioned that, although paralysis of the hind quarters may be associated with severe kidney worm infestation, the condition may be also a result of other causes. As the disease advances the animal spends most of its time lying down, rising to its feet only when urged, and death may follow this stage in a very short while. Emaciation may occur but is not always included among the symptoms of the disease, as animals which appeared in good condition have died as a result of infestation. Kidney worm disease is extremely difficult to detect in the early stages, and the presence of the worms may be detected only after an examination of the urine, with which the eggs of the parasites are carried out of the body.

Economic Losses.

The economic losses following kidney worm infestation may be regarded in two ways, firstly, as the loss sustained by the farmer through diseased herds, and, secondly, as the loss in the pork and bacon industries through rejection of infested parts of the carcass and sometimes the whole carcass.

To the farmer, besides the direct losses occurring through the deaths of infested animals, kidney worm infection means an unthrifty herd producing little profit. With feed, building equipment, and labour all high priced the margin of profit is by no means large, and what profit may eventuate must be adversely affected by the presence of these

parasites. The most profitable pig is, of course, the disease-free pig which reaches marketable weight in the minimum of time. The pig that harbours kidney worm is held back in its growth, and does not attain the desired weight till perhaps twelve months old. Furthermore, heavy infestations produce a lowering of the vitality of the host, and the pig becomes susceptible to many other diseases which, probably, would be successfully resisted by a worm-free animal.

In the pork and bacon trades infestation usually means the rejection of the affected parts. The livers and flares (the kidneys and adjacent fat) are the parts generally implicated, and perhaps at the present time, as no great value is placed on these parts, the economic losses resulting from their condemnation are not felt to any great degree by the industry concerned. The liver, however, may prove a valuable commercial asset, its extract now finding a ready sale for medicinal purposes from at least one factory. Under such circumstances, especially when it is pointed out that a recent investigation showed that of 62.8 per cent. livers that had been condemned, no less than 72.1 per cent. were discarded because of kidney worm infestation, the losses take on a more serious aspect.

The position as regards the export trade in pork is, at the present time, far more acute. The world's requirements in the way of pork are far in excess of the production, and great possibilities for the expansion of this industry exist, and no time has been more favourable for this expansion than the present. The United Kingdom is, to-day, most favourably impressed with the type and quality of the pork exported from Australia, and is willing to take as many first-quality carcasses as can be supplied. The export trade is experiencing difficulty in obtaining sufficient numbers of suitable disease-free pigs, and investigation has revealed that much the greater number of rejections is a result of kidney worm infestation.

The pig, mainly perhaps through the use of germ-infested milk, appears more prone to tuberculosis than any other animal, and for public safeguard most careful inspection is made of all carcasses. Carcasses are examined in Australia before export, and the ticket of health is checked in the United Kingdom before entry is permitted. For this purpose certain glands are exposed and incised, and must be present in the carcass for check inspection. The infestation of the renal fat by the kidney worm usually involves the removal of the renal glands, and a carcass in which these glands are not available for inspection is refused import. Infestation of the muscles along the

THE KIDNEY WORM OF PIGS (*Stephanurus dentatus* Diesing).

(Description of Plate, page 297.)

- Fig. A. A normal healthy kidney. Note the evenness and uniformity of its surface.
- Fig. B. A kidney lightly infested with kidney worm. The pelvis of this kidney was distended with pus in which three worms were found. Several worm tracts were also noticed in the kidney substance. Note the small, dark, sunken areas which are scars of healed injuries.
- Fig. C. This kidney was obtained from a very heavily infested backfatter.
- (a) These whitish sunken areas are the result of excessive growth of the connective tissue.
 - (b) Scars of healed injuries.
 - (c) A large retention cyst. This cyst extended fully an inch into the kidney and was filled with watery pus.
 - (d) This portion of the kidney has been sectioned to show numerous worm tracts.

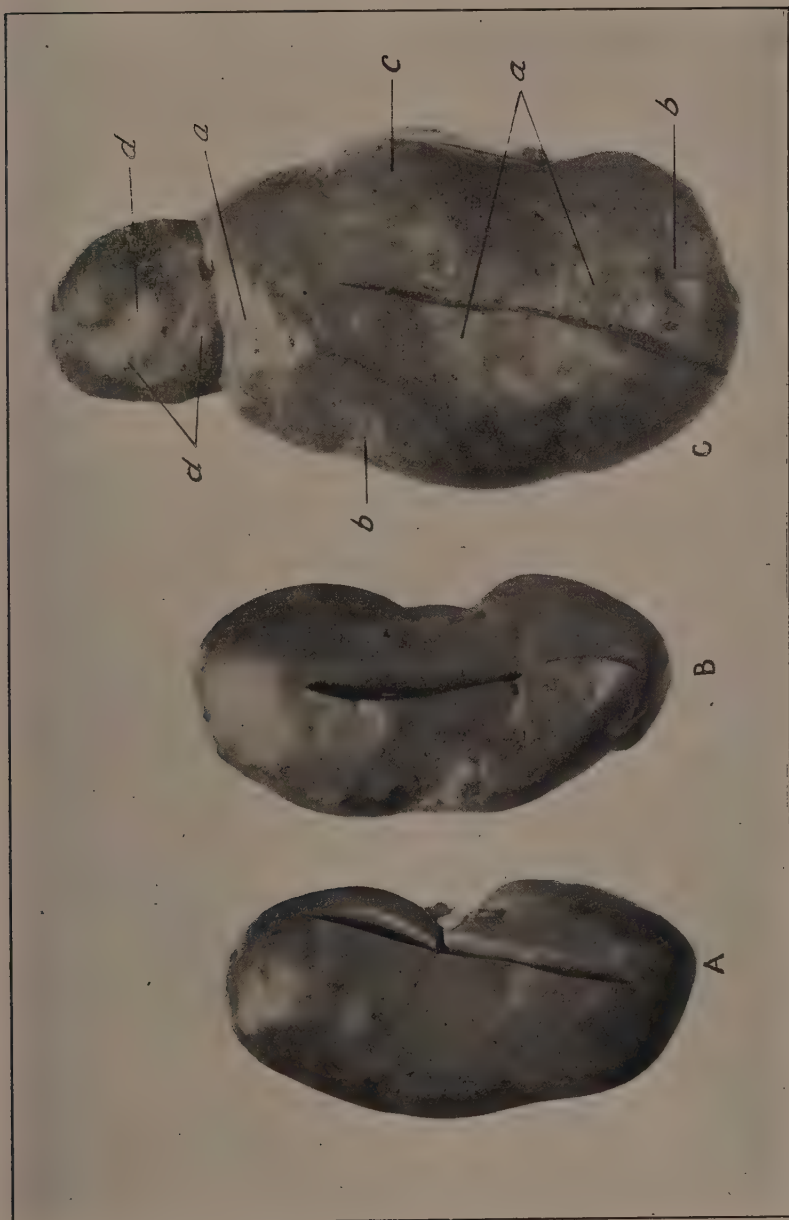


PLATE 79.—THE KIDNEY WORM OF PIGS (*Stephanurus dentatus* Dising).
 (For description of Plate, see page 296.)

back and on the ribs is a further cause of rejection, as the removal of these worms results in a mutilated carcass. Such carcasses may be accepted in the East, but, as the future of the export trade lies to the greater extent with the United Kingdom, such large interferences cannot but have a most serious effect on the trade. The difficult position in which the export trade finds itself is revealed by the following figures of infestation. Returns of 51,774 pigs slaughtered throughout the State between November, 1930, and February, 1931, showed that no less than 29.5 per cent. were infested, whilst from those districts supplying the Southern export trade the percentage infested was 32.5.

The figures given above and the accompanying remarks serve to indicate the position in the pig industry that the kidney worm has assumed and emphasise that if the industry is to prosper, as it should with the present excellent prospects, drastic measures will have to be taken by all concerned to bring this parasite under control.

Distribution of the Kidney Worm.

The kidney worm appears more prevalent in tropical and sub-tropical countries than elsewhere. It is known in the United States, more especially in the Southern portions, the West Indies, Central and South America, South Africa (rare), Asia, the Philippine Islands, and Australia. In Australia, both Queensland and New South Wales are in its area of distribution, whilst it has occasionally been reported from Victoria. In New South Wales its range is practically confined to that portion of the coast north of Sydney, and in Victoria the records have probably come from pigs imported from the northern infested areas. In Queensland the parasite is known from practically every locality where pigs are bred, the more heavily infested districts comprising the coastal areas, especially those of the tropical north.

Figures supplied during the months November, 1930, to February, 1931, showed that infestation of the area from Rockhampton north was 62.1 per cent., of south-eastern Queensland including the north and south coast and Moreton areas, 32.5 per cent., and of the Toowoomba-Warwick districts only about 2.5 per cent. Research has shown that the free living stages of the parasite are dependent, among other things, on the maintenance of moist conditions. The higher the rainfall, therefore, the more suitable would conditions be for its development. This is shown by a heavy northern infestation which is associated with an annual rainfall which may be as high as 158 inches, by a smaller

THE KIDNEY WORM OF PIGS (*Stephanurus dentatus* Diesing).

(Description of Plate, page 299.)

- Fig. A. This photograph represents a normal healthy liver obtained from a pig free of kidney worms. Note the evenness of its surface and the dark uniform colour.
- Fig. B. A liver taken from a pig heavily infested with kidney worm. Compare the appearance of this liver with that above. Note the pale mottled appearance and the unevenness of its surface. The excessive growth of the connective tissue is very conspicuous especially towards the edges of the lobes. The numerous, whitish, raised areas represent places in the liver where the liver substance has been completely replaced by connective tissue. These areas extend into the liver for various distances and abound in worm tracts. The parasites causing all this damage had all migrated to the kidney fat from which sixty-two worms were collected. The very appearance of such a liver amply demonstrates the severe drain that kidney worm infestation has on the health of the pig.



A



B

PLATE 80.—THE KIDNEY WORM OF PIGS (*Stephanurus dentatus* Diesing).
(For description of Plate, see page 298.)

southern infestation with a rainfall of 34 to 45 inches, and by a light infestation of the Toowoomba-Warwick area where the rainfall is only 27 to 36 inches.

Temperature is also probably an important factor. The optimum temperature for the development of the free living stages has been shown to be in the vicinity of 75 deg. to 80 deg. Fahr. Temperatures below 75 deg. Fahr. have been found to retard development, at 46 deg. to 52 deg. Fahr. the development of the egg may be almost entirely suspended, whilst still lower temperatures will bring about total egg decomposition. Examining now the temperatures of the districts concerned—only the minimum temperatures need be considered—it will be seen that those for the coastal areas vary between 55 deg. and 63 deg. Fahr., whilst for the Toowoomba-Warwick district minima of 50 deg. to 53 deg. Fahr. are noted. Moreover, the frequent heavy frosts of this district, no doubt, also assist in reducing the chances of the hatching of the egg and the development of the larva.

The influences of rainfall and temperature are also shown in the reported heavier infestation of pigs slaughtered during the winter months. From about May to August the percentage of infested pigs is said to be higher than at any other time of the year. This is, no doubt, due to the fact that the eggs laid in summer, from which the adults found in the winter have developed, are provided with warmth and adequate moisture for their development by the summer temperatures and rains, whilst if deposited during the winter they would be subjected to the adverse cold and dryness of the season.

Life History of the Kidney Worm.

In order to reach maturity the kidney worm must inhabit the kidney fat. In other situations eggs are not deposited and it seems that these organs are attacked only during the migrations of the parasite within the body in an endeavour to reach these fatty tissues. In the perirenal and periuretal fat, the cysts containing the worms are connected by fine canals with the ureters, through which the eggs pass with the urine to the bladder, eventually reaching the exterior.

The egg (Plate 78, fig. 1), when passed out, measures only about 1/250th of an inch in length with a breadth of about 3/1250th of an inch. It is then in an advanced state of segmentation and under favourable conditions of temperature and moisture will hatch in one to two days. The newly hatched larva is little more than three times the egg length and moves about very actively in the moist earth in which it lives. After some hours of activity it lies motionless for a little time and eventually sheds its skin. The second stage larva is very similar to the first and also has periods of activity and rest. A second moult occurs but is not complete, and the larva, which is approximately twice the length of the first stage, remains encased in this moulted skin. This stage is reached in five to eight days after the egg has hatched. (Plate 78, fig. 2.) It is by larvæ of this type only that the pig may become infected. These larvæ gain access to the pig in two ways, they may be taken in with food and water, or they may burrow through the hair follicles of the skin. They eventually reach the liver, where they remain for some time, developing and feeding on the liver tissue. After a period of five or six months the worms are in the adult stage, and, leaving the liver, make their way to the kidney and uretal fat, where at last they become mature and lay eggs.

Control.

In the life cycle of the kidney worm there are two distinct stages, a preparasitic or free living stage which is spent in the soil outside the body, and a parasitic stage which is spent in the tissues of the host. The parasite may be said to be confined to the pig, as it is extremely rare for any other animal to be infested. This knowledge somewhat simplifies control measures as only the pig and the conditions under which it is housed need be considered.

Since the worms are embedded in solid material and located in tissues not connected with the digestive tract, treatment with drugs in the ordinary way is practically useless. In such a case, therefore, preventive measures are of more than usual importance. Control measures, which may be successfully applied to maintain worm-free herds, are:—

(1) Clean pigs should not be allowed to come into contact with infested pigs or their secretions. Pigs should be excluded from all grounds known to be infested—i.e., grounds on which infested pigs have been running or which are connected in any manner whatsoever, by drainage, &c., with other grounds on which infested pigs have been allowed to graze.

(2) If the animals are stied, the sties should have concrete or asphalt floors or be built of slabs raised above the ground, allowing the urine to drain through.

(3) Food troughs should be built so that the animal is unable to place his feet in the trough and so carry infection from the ground directly into his food.

(4) Under suitable conditions of heat and moisture the mature larva is able to survive as long as about five months. A sty or paddock which is suspected as being infested would therefore require to be spelled at least six months before being judged safe for restocking.

(5) Investigations have shown that sunny, dry conditions are very unfavourable to egg and larval development, an exposure of thirty to sixty minutes to these conditions being ample to ensure the decomposition of the eggs and the death of the larvæ. The utilisation of this knowledge opens up a fairly straightforward method of control. Sties and paddocks should be so situated that they receive the maximum of sunlight. An efficient drainage system is required so that dry conditions may be maintained. Special attention should be given to those areas constantly kept moist through the accumulation of urine. Frequent turning over of this heavily contaminated soil will expose larvæ and eggs to the sunlight and aid in obtaining a more rapid evaporation of the moisture. In small paddocks ploughing and harrowing will be found advantageous in maintaining dry surface conditions. Wallows, if considered necessary to pig welfare, should be constructed of concrete and kept scrupulously clean. Mud wallows should be eliminated, as they constitute one of the primary sources of infection.

(6) The Department of Agriculture and Stock is willing to assist in determining whether any suspected pig is infested with this parasite. A small quantity of the urine should be caught in some way or other and forwarded to the Department, where it will be examined for the presence of eggs.

GLOSSARY.

The *perirenal and periureteral tissues* refer to the heavy layers of fat which surround the kidneys and ureters.

The *ureters* are the ducts leading from the kidneys to the bladder.

The *lumbar region* comprises the tissues in the vicinity of the lumbar vertebræ—i.e., the loins.

The *costal region* concerns the ribs.

The *diaphragm* is a muscular partition separating the thorax from the abdomen.

The *pleura* is the membrane lining the thorax. There are two pleura, each lining one side of the thorax and the adjacent lung.

A *pathological lesion* in a tissue is an injury resulting directly or indirectly from the presence of a parasite. The liver is divided into a number of more or less distinct lobes by fissures or clefts. The liver substance consists of minute *lobules* enclosed and separated from one another by *interlobular* or connective tissue. Each lobule is composed mainly of a number of microscopic cells, the *hepatic cells*, which are concerned in the secretion of bile.

Toxins are highly poisonous substances.

The *renal glands* are situated near the kidneys, the *portals* near the liver, and the *mesenterics* in the large membranous sheet, the *mesentery*, that is suspended from the abdominal wall and supports the intestines.

The *peritoneum* is a membrane lining the abdominal cavity.

The *pelvis* of the kidney is the internal cavity.

The *lumen* of a blood vessel is the cavity through which the blood flows.

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Readers are reminded that a cross in the prescribed square on the first page of this "Journal" is an indication that their Subscription—one shilling—for the current year is now due. The "Journal" is free to farmers and the shilling is merely to cover the cost of postage for twelve months. If your copy is marked with a cross please renew your registration now. Fill in the order form on another page of this issue and mail it immediately, with postage stamps or postal note for one shilling, to the Under Secretary, Department of Agriculture and Stock, Brisbane.

DEPARTMENT OF AGRICULTURE AND STOCK.

VISIT OF SCHOOL CHILDREN.

In this time of difficulty, to the land we turn naturally as the source of our national stability. Primary production is the real material wealth of Australia. Prosperity for commerce and community services can only come from rural industries.

To you young people I therefore commend the consideration of the possibilities of a career on the land in your own country. Its attractions and its rewards, the really worth while things of life, far transcend those of the city. From my own experience as a farmer, I can assure you that country life and work have compensations, material and otherwise, to which the artificialities of the city cannot be compared.—HON. HARRY F. WALKER.

SUGGESTED by happy thought, arranged by Mr. Richard Hill, M.L.A., and welcomed cordially by the Minister of Agriculture and Stock, Hon. Harry F. Walker, several parties of scholars from the Kelvin Grove Electorate visited the Department of Agriculture on Thursday, 9th April.



The object of the visit was to impress on the minds of the children the great importance of agriculture and animal husbandry in the economy of the Commonwealth. Also to give them an insight into the immense value and wide range of Departmental services to the man on the land.

The visiting scholars numbered 150—thirty-eight boys from the Kelvin Grove Boys' School under Mr. A. J. Collins, A.T.; fifty-six girls from Kelvin Grove Girls' School under Misses M. J. Carraway, H.T., and N. Burke, A.T., and Messrs. V. W. Wilson and G. A. Henley, student teachers; and fifty-six boys and girls from Ithaca Creek School under Messrs. A. E. Blunt, H.T., and R. J. Cochrane, A.T.

WELCOMED BY THE MINISTER.

On arrival at the Department each group was received by the Minister, Mr. Walker, who addressed the children briefly. Other short addresses were delivered by Messrs. E. Graham, Under Secretary, R. Hill, M.L.A., and B. J. McKenna, Director of Education. Suitable responses were made by the leaders of each party.

In the course of his remarks, the Minister said that there was nothing finer than to meet so many young Australians all intent and eager to learn something of their great basic industries. In their hands was the future of Queensland and the Commonwealth. Their visit was evidence of their keenness to know something of the real work of the country. The great training grounds for Australians were the home, the garden, and the farm, and their healthy environment. The encouragement of country life and the preservation of "country" conditions in their cities made for the health and happiness of the people. It was not, however, what people knew, so much as what they were. The best of all fine qualities they were cultivating was character, the character with which they would face fearlessly and independently the problems of after life. Those problems they would tackle with frankness, freshness, and vigour, having learnt in their schools and on their playgrounds the value of quick decision and keen enthusiasm in all the tasks they undertook. As a nation they had set up high standards, and those that they had in mind were in most cases the standards of the bush, from which, after all, they had really acquired their national character.

To the man on the land, the Department of Agriculture and Stock, like the Education Department, was one of the most important of their administrative and directive services. That day they would have an opportunity of seeing the scientists and experts of the Department engaged on work of great value to all engaged in the primary industries, on the success of which so much of the prosperity of Queensland



PLATE 81.—KELVIN GROVE STATE SCHOOL (BOYS)—SCHOLARSHIP CLASS.

Seated in the centre, left to right, are Mr. A. J. Collins, A.T., and Mr. R. Hill, M.L.A.

depended. In every branch of farming and stock-raising, guidance was given freely by men of the Department whose personal knowledge of local conditions in every district, skill, and practical experience were at the disposal of anyone engaging in a life on the land. The Department was organised along sound administrative, commercial, and educational lines.

In this time of difficulty they turned naturally to the land as the source of their national stability. Primary production was the real material wealth of Australia, and prosperity for commerce and community services could only come, in the main, from their rural industries.

Mr. Walker then contrasted the conditions of bush life with those of the city to the vast advantage of the former. He expressed his pleasure at receiving the scholars, whose freshness, brightness, and intelligence had greatly impressed him, thanked Mr. Hill for the opportunity of meeting them, and congratulated him on the happy idea that made it possible.

"To you young people," he concluded, "I commend heartily the serious consideration of the possibilities of a farming career in your own country. Its attractions and its rewards, the really worth while things of life, far transcend those of the city. From my own life-long experience as a farmer I can assure you that country life and work have compensations, material and otherwise, to which the artificialities of the city cannot be compared."

The scholars then formed small groups and each, with a departmental officer in charge as guide, commenced in turn a tour of inspection and inquiry. A very instructive and enjoyable day was spent.

Publicity and Record Sections.

In the office of the Editor of Publications the young people were shown how the "Queensland Agricultural Journal" is produced, all the literary and technical processes of journal and pamphlet production being described.

Keen interest was displayed in the Photographic Section where photographs of the children, taken that morning on arrival, were being developed and printed.

In the Despatch Office, modern methods of handling a vast volume of correspondence, and the despatching of the Journal and numerous other publications, were explained.

The Record Room was a scene of busy activity, and there the completeness and efficiency of a modern filing system were demonstrated.

The Library was next visited. Files of current country newspapers, and technical and scientific journals from all over the civilised world were seen, and methods of indexing literature on the Dewey decimal system illustrated.

In the Correspondence Section, the visitors saw a whole battery of typewriters at work on that day's mail. This section interested the girls particularly, and the whole system of dealing daily with voluminous correspondence was courteously given by the young ladies in attendance. The duplicating and other up-to-date office equipment was seen in action, and from the whole room was received an impression of the importance of efficient routine and office administration.

Cotton.

In the Cotton Section the children learnt something of the extent of cotton-growing in Queensland and the quality of the product. To each was handed a sample of fibre in boll and lint.

Sugar.

Moving on, each party in turn entered the laboratory of the Bureau of Sugar Experiment Stations, where the value of scientific tests and investigations was demonstrated most interestingly. Departmental work in soil science, pathological work, and the improvement of technical processes covered a wide field of explanation and demonstration. The inquiring mind of the intelligent youngster is known to every parent who endeavours to satisfy natural curiosity more or less satisfactorily, if not occasionally with irritability, and the science men showed infinite patience and understanding in their ready answers to the volleys of questions fired at them.

Pure Seeds Branch.

In the Seeds, Stock Foods, Fertilizers, and Pest Destroyers Investigation Branch the young visitors were given practical demonstrations of seed testing. Other activities were described in clear and easily assimilative terms. The children were shown how the Department protects the interests of the farmer in respect of the quality of seeds and other substances of which purity is an essential in economic production.



PLATE 82.—ITHACA STATE SCHOOL—SCHOLARSHIP CLASS

Seated in the centre, left to right, are Messrs. B. J. McKenna, Director of Education, R. J. Cochrane, A.T., R. Hill, M.L.A., A. E. Blunt, H.T., and the Hon. Harry F. Walker, Minister for Agriculture and Stock.

Entomological Division.

The entomological and plant pathological laboratories proved an irresistible attraction to the youthful investigators. To the boys especially, an appeal was made to help in the preservation of our insect-eating birds, the feathered friends of the farmer. The museum where were exhibited, in specimen and excellent drawing, many of our animal and vegetable pests, also insects beneficial to man and his industries, was another mine of information to the enthusiastic inquirers.

Animal parasites were shown under the microscope in the parasitologist's laboratory, while in an adjoining room the tiniest of insects were examined in all the detail of their bodily formation in the ray of a powerful projector. The Departmental illustrator was also seen at work on wonderful drawings of harmful insects and the effects of their ravages, for reproduction later in the Journal. So interested were the visitors in the work of the scientific services generally that the time of their tour had to be extended.

Laboratory of the Agricultural Chemist.

A move to the laboratory of the Agricultural Chemist followed, and there was observed in progress much important analytical work which covered a wide range of service of great importance to the manufacturing as well as the producing side of rural enterprise in Queensland.

Meat Inspection Depot.

Interesting explanations and demonstrations of methods employed at the Central Meat Inspection Depot, within the precincts of the Department, followed. The vast value of this work, especially from a public health point of view, was impressed on the young people. Meat was condemned in their presence and reasons were given and taken down in rapidly filling notebooks.

Wool Room.

In the Wool Room adjoining, all classes of fleeces from farmers' flocks were displayed. "Tops," "counts," and other technical terms were defined, and as much information that could be crowded into a limited time was given on the value of Queensland's great wool industry.

Cotton Classing.

From the Wool Room to the Cotton Classing Floor was a step or two, and there Queensland cotton was arranged in various grades and classes alongside samples from the United States for comparison.

Wheat and Maize Breeding.

Entering the Seed Room, the children were confronted with long tables laden with grain in husk and sheaf. In great variety were displayed the impressive results of scientific grain breeding. The system of wheat and maize propagation was explained in detail. The youngsters, no doubt, left convinced by practical object lesson of the substantial value of the services of the Department in grain production in Queensland.

Herd Testing.

Officers of the Dairy Branch were then seen at work testing cream samples in connection with their important work of herd improvement. Every normal youngster, whether its the works of a watch or a wheelbarrow, is interested in "wheels going round," and to see actual processes, of which they had formerly but a hazy knowledge, if any, was to them an absorbingly interesting experience.

The "Picking Over" Floor.

One of the most popular experiences in the day's itinerary was the visit to the picking over floor where a large consignment of seed potatoes was under examination for potato fly. The officer in charge explained the importance of the precautions taken against the introduction of fruit and vegetable pests and the means taken to prevent it.

A couple of cases of luscious pears and apples, the product of Queensland orchards brought from the markets that morning, were placed on a stand so that the youthful visitors might apply practically, by invitation, what they had learnt of the art of "picking over." With sharpened appetites the task was completed in record time.



PLATE 83.—KELVIN GROVE STATE SCHOOL (GIRLS)—SCHOLARSHIP CLASS.

Seated in the centre, left to right, are Miss N. Burke, A.T., Mr. R. Hill, M.L.A., and Miss M. J. Carraway, H.T., Messrs. V. W. Wilson and G. A. Henley, student teachers, are on the flanks.

Essay Competition.

Observing the keen and intelligent interest displayed by the scholars, Mr. Walker announced that he would give prizes to two pupils from each of the three schools who submitted the best essays on the subject of the impressions of the purposes, value and importance of the work of the Department of Agriculture and Stock, based on their visit. In addition, Mr. Hill promised to give a medal for the best essay submitted from all of the three schools.

Light luncheon for the young people was provided by the Department of Agriculture and Stock, and among those present in the course of the day were Messrs. F. W. Butler, M.L.A., and B. J. McKenna, Director of Education.

Before returning to their respective schools, thanks were expressed to the Minister and his officers by Messrs. Blunt and Cochrane (Ithaca), and Mr. Collins, of Kelvin Grove. Hearty cheers were given by the children for Mr. Walker and his Department, which were acknowledged on their behalf by Mr. R. P. M. Short.

PSEUDO POULTRY PLAGUE.

THE heavy mortality that has followed an outbreak of pseudo poultry plague in the various countries where the disease has occurred has served Australia in good stead; for immediately a definite announcement was made of its presence in Victoria the Department of Agriculture in that State instituted a most rigorous system of quarantine. The early action taken is responsible unquestionably for the prevention of the spread of the trouble.

As the disease is of such a serious nature, and Queensland breeders are unfamiliar with the general symptoms, the following extract from an article by R. N. Johnstone, B.V.Sc., in the "Journal of Agriculture," Victoria, is reproduced herewith for their information:—

"The first symptom noticed is that the bird becomes sleepy and will stand by itself, the tail droops, and every now and again the bird will shiver or make a convulsive movement. If grain is offered, the bird will pick at it in an unconcerned way. The respirations are increased. There is a watery, yellowish-white, foul-smelling diarrhoea. As a rule, the crop is distended with a sour-smelling greyish-brown fluid.

"In the majority of natural cases there is a thick mucous discharge from the nostrils, and in the mouth a varying amount of frothy exudate which occasionally hangs in threads from the end of the beak. The comb and wattles become dark in colour. The most characteristic symptom noticed is in connection with the respiration. There is a long, gasping inhalation through a half-opened beak. Death usually occurs between the third and sixth day after symptoms develop. Occasional birds may die without showing any symptoms. A few may live much longer, and some may even recover. These birds, however, become partially paralysed as the disease progresses, and those which continue to live remain paralysed in one or both legs, or have their necks distorted, and are quite useless for practical purposes.

"As with most diseases of this nature, the post mortem lesions are not constant. As a rule, however, the skin and muscles will be found to be slightly darker than normal. In the fat around the gizzard a number of dark-red blotches, due to hæmorrhage, are noticed. The small bowel immediately behind the gizzard shows hæmorrhagic blotches. The lining of the sac immediately in front of the gizzard—the proventriculus—is found to be hæmorrhagic. The sac around the heart sometimes has an excess of fluid. The contents of the bowels frequently consist of liquid only, and are grey in colour.

"The droppings, the discharge from the mouth and nose, the blood, and every portion of the body of the bird are infectious; and, therefore, the disease may be spread by feeding birds on hotel offal which may contain uncooked portions of affected birds or bread scraps, leaves, or peelings of vegetables which have been soiled by the hands of persons who have stuffed and trussed birds for cooking, or shells of eggs which have been soiled on an infected farm. It may also be spread by fowls which come in contact with infected birds in markets, or which are placed in crates or coops which have been occupied by infected birds, or soiled by their droppings. It may also be carried from one pen to another or from one farm to another by persons whose boots have become soiled with the droppings of infected birds."

POULTRY DISEASES—I.

By P. RUMBALL, Poultry Expert.

IT is impossible in the course of a paper—or several papers, for that matter—to deal fully with the question of diseases in poultry. I trust, however, to be able to cover many of the disorders met with in Queensland. With some troubles many will be familiar; but it is hoped that those breeders will bear with me, as beginners are constantly entering into this industry—hence the necessity of referring to the simplest ailments.

On account of the heavy mortality that is at times experienced, and the economic loss to the industry, the question of disease must receive more serious attention in the future than has been the case in the past. This is necessitated by the ever-increasing competition and the consequent need of getting costs down to bedrock. The time when one would say, "It is only a hen, or a few chickens," is gone. For the moment the loss of a few birds may not amount to much, but in the aggregate it means a good deal to the industry, and at the end of the year a lot to the individual breeder.

It is not suggested that time and money be spent in treating individual birds, but rather that at all times methods more suited to the prevention of disease should be adopted, and it will be readily understood that it is only by having some knowledge of disease that efficient means of prevention may be employed.

There are, however, diseases that enter the poultry-yard despite all precautionary methods, and when the disease is of an epizootic nature time and money must be spent in the treatment of birds. The breeder will have to be guided by circumstances and weigh the advisability of persevering with methods of treatment and eradication as against a stamping-out process by the destruction of sick birds. The trouble is that in most cases the disease has spread to more than one pen of birds before it is noticed, and is more or less of a general nature.

As the highest mortality in the poultry-yard is usually among chickens and growing stock, it is considered that the troubles affecting this class of stock should receive prior consideration before passing on to the question of disease of a general nature. Incidentally, a breeder will generally evince a greater interest in adult stock that are the result of successful rearing than he will in a flock reared through constant trouble. Again, the health and stamina of adult birds depends a good deal upon efficient rearing.

First Principles.

As previously mentioned, many of the diseases and disorders in poultry-raising can be guarded against. This is particularly so with chickens and growing stock, and, although the question of disease is being discussed, I cannot refrain from referring to a few principles of brooding of importance to the health of the birds. With any type of brooder it is essential to maintain a correct temperature, for excessive heat has a weakening effect; whereas if the temperature is too low the chickens will crowd, become over-heated, and probably be more weakly than those that were supplied with an excess of artificial heat. It is essential to provide a pure-air supply without draughts, and to bear in mind the fact that, as chickens grow, they require more air.

Another essential is exercise; get them running out in the sun as much as possible, as sunlight assists in development, but at the same time provide shade. Avoid overcrowding stock in either brooders or houses. Keep the brooders and all equipment scrupulously clean, and feed only wholesome foods. Although economy in rearing is essential, it does not necessarily follow that the cheapest food will give satisfactory results. The quality of a food generally governs its price.

The Wisdom of Close Observation.

There are certain well-defined symptoms among sickness in young growing stock that enables one to gather the nature of the disease or the trouble, and it is essential that the breeder acquires the art of detecting any sign of trouble immediately on entering his brooder-house, his rearing-pens, &c., in the course of his daily duties. It should not be necessary to make a special inspection of the farm for the purpose of detecting sick birds. The breeder should school himself until, to him, the most prominent bird in the flock is a sick one. When he has done this, he is able, to a large extent, to prevent the various troubles from extending to dangerous proportions. For instance, if, on visiting the brooder-house, it is noticed that chickens are picking

the toes of another chicken, it is palpable that "cannibalism" is present, and, if no immediate action is taken, the trouble will spread until the vicious habit assumes serious proportions.

In the first week or two chickens frequently droop their wings, are listless in appearance, and pasted up around the vent. This is evidence of simple diarrhœa. If from two weeks onwards up until, say, twelve weeks, chicks droop their wings, the tips of which are frequently soiled, appear to lack energy, and are passing reddish droppings, coccidiosis should be suspected.

Chickens during the first week or two of their lives often become wet and dirty around the eye. This is evidence of what is termed "sore-eye." Once they have left the brooders, birds with eyes that are moist and discharging, faces probably swollen around the eye, with a mucous discharge from the nostrils, and, frequently, dirty wing-bows, are most likely afflicted with colds.

Unthrifty chickens—chickens that are making poor growth, thin and pale in the shank, roughened in plumage—may be infested with lice, particularly head lice with hen-hatched chickens, or preyed on at night by mite, or infested with intestinal worms. A careful examination will indicate to the breeder the cause of the trouble.

If the chicken, from a few weeks of age onwards, experiences difficulty in walking, but is normal otherwise, the trouble is probably due to what is known as leg-weakness. If small yellow pimples are noticed on the comb and bare portions of the head, later becoming enlarged and darkened and much like a wart, the trouble is chicken-pox.

The foregoing will facilitate the diagnosis of many of the troubles common to chickens and young stock. In the more obscure cases it will be desirable to resort to a *post mortem* examination, which will be dealt with later, but, in order that breeders may be enabled to treat those already indicated, brief reference to the cause and treatment is given.

CANNIBALISM, TOE-PICKING, &c.

Cause.—This is not a disease, but a condition that is frequently brought about by wrong conditions and accidents. The trouble is noticed in adult stock, as well as in chickens of all ages.

With very young chickens it is frequently due to over-crowded conditions in the brooder and undue confinement—the lack of activity; or it may commence by a chicken accidentally injuring a toe or some other portion of the body, causing blood to flow. Poultry, both young and old, readily acquire a taste for blood, and the vicious habit of pecking and disembowelling one another rapidly spreads.

Among hens the cannibalistic habit is frequently caused by one bird having a true case of prolapsis of the oviduct. The red protruding mass attracts the attention of others in the pen. They peck at it, cause blood to flow, with the consequence that the more vicious of the flock develop the habit of pecking the vent of any hen while straining to lay. This pecking causes the part to become inflamed. This makes it difficult for a bird to lay, lengthening the period of straining, with the result that the part is again pecked, and in many cases the bird is disembowelled.

Treatment.—Remove the affected birds. With chickens, promote exercise by feeding frequently, and endeavour to keep them active by feeding succulent green feed for them to tear about. Increase their liberty as much as possible.

In the case of hens, as the trouble occurs through attacks while laying, darken the nests and make the conditions as secluded as possible. This, it will be found, will frequently correct the trouble, but, at the same time, if it is possible to increase the liberty of the birds in order to prevent a number gathering together with nothing to do, the correction of the trouble is facilitated.

SIMPLE DIARRHŒA IN CHICKENS.

Diarrhœa in poultry is of such a widespread nature that it is as well to confine our attention to one phase of the disorder and to treat general diarrhœa under a separate heading.

Cause.—The trouble is principally due to chilling and over-heating. Experiments conducted show that the mortality in chickens subjected to chilling during the first week of their lives amounted to 75 to 80 per cent., while chilling during the second caused a loss of 15 to 20 per cent. There was also a great disparity in the body development of the chickens which had been chilled as compared with those that had been correctly brooded.

The feeding of chickens too soon after incubation retards the assimilation of the yolk which is drawn into the abdominal cavity just prior to hatching, with the result that a certain amount of fermentation takes place, sometimes causing diarrhoea.

Treatment.—Correct the conditions. Flush the system with Epsom salts by dissolving the right quantity in sufficient water to mix a wet mash. In feeding this mash, spread it well out so that each chicken has an opportunity of obtaining its proportion. The quantity of salts to be administered per 100 chickens varies according to their age. Chickens under five weeks should receive about 3 oz., and for every additional four weeks add 1 oz. per 100 birds.

COCCIDIOSIS.

Cause.—Coccidiosis is caused by a microscopic parasite termed *Eimeria Avium*, which, when taken into the digestive tract by susceptible chickens, rapidly develop and multiply on the walls of the intestines, particularly the cæca or blind gut.

This organism passes through many stages during its life cycle, which it completes in a period of about five to six days. The infection spreads from bird to bird by medium of the droppings, and is capable of remaining dormant in the soil for a period of over twelve months. Wild birds, as well as chickens and adult poultry, are susceptible to the disease, but in adult fowls the mortality is not excessive.

It will be seen, however, that the two main sources of infection are the soil and the adult, and that it is possible for the disease to be spread by a wild bird, the running of adult stock in the chicken pens, and by means of droppings adhering to the feet of the attendant.

A *post mortem* examination materially assists in a field diagnosis of this disease. The upper portion of the small intestines may be found in an inflammatory condition. Blood may also be present among its contents. These conditions in young chickens are usually more pronounced in the cæca, which is frequently distended with blood. Blood, however, in the intestines is not a consistent symptom.



PLATE 84.—CHICK WITH COCCIDIOSIS IN SEVERE FORM.

Note the tips of the wings are stained with blood.

Treatment.—This consists of protecting the birds against infection and the feeding of liberal quantities of butter-milk. Dr. Kerr, of the National Poultry Institute, has recently intimated that a combination of iodine and milk is a most effective form of treatment. This method, however, has not been tried in Queensland, but highly satisfactory results have followed the practice of feeding extensive quantities of butter-milk, combined with strict sanitary methods.

As the organism responsible for the trouble is voided with the excreta, it follows that the best means of protecting the birds from infection is to avoid, as far as possible, contamination of the water and food supplied. The receptacles should be

so placed that the chickens cannot foul them. As chickens are constantly picking up particles of food, &c., from the floor, and as the organism, two days after being voided, is in a suitable state to pass through another stage of development once it is consumed, it indicates that the pens and houses should be cleaned at least every forty-eight hours. In the cleansing of the pens reliance cannot be placed upon the destructive powers of an ordinary disinfectant. Consequently, the places in which the chickens are housed must be thoroughly cleansed of all loose material. It also follows that the practice of feeding grain in the litter or on the ground should be discontinued. In fact, during the height of the trouble it is advisable to cease feeding grain. In cases of severe outbreak the removal of all food and the feeding of pure buttermilk for a day, followed by the feeding of a mash containing 20 per cent. of buttermilk for a period of six days, then breaking it down to a 10 per cent. mixture, is recommended. If the case is not very severe, commencing with a 20 per cent. buttermilk ration will be found effective, providing it is assisted by strict sanitary measures.

Buttermilk powder possesses the desirable feature of being nutritious and at the same time has laxative properties. It is a most valuable food, and should be fed by poultry farmers as a protective measure. Its use at the rate of 10 per cent. eliminates the necessity for any other form of animal protein.

SORE EYES.

This is not a disease, but a condition due to an irritant of some nature gaining entrance to the eye, causing it to water freely, and dust to adhere. The eyelids do not become glued together as in the case of colds, but just have a moist, dirty appearance. This trouble has been noticed where breeders have used chips for litter in which emery powder is present.

The treatment consists in removing the cause and renewing the litter when it becomes dirty and dusty.

COLDS.

Cause.—Ordinary colds usually occur on account of the lack of ventilation, or over-crowding, or due to draught. They are rarely noticed in flocks with ample run and well housed.

Treatment consists in the removal of the cause, flushing the system with salts, and, when the eye is inflamed, to place in it two or three drops daily of a 10 per cent. solution of argyrol. Many colds are of a contagious nature, and it would probably be wise to medicate the drinking water with permanganate of potash or some other suitable disinfectant. If the birds become at all feverish, aceto-salicylic acid at the rate of a quarter of an ounce to the gallon of drinking water should be added. To increase its solubility, potassium or sodium carbonate should be added in small quantities.

PARASITES.

The parasites to which chickens and growing stock are subject may be classified as internal and external. Among the external are the tick, mite, and body lice of all kinds.

The Tick.

Description.—The seed tick before feeding is naturally small and almost white in colour. It has six legs. After feeding it swells considerably and becomes darkened. The adult tick is a bluish-grey in colour, oval in shape, more or less flat, and varies in length from one-eighth to three-eighths of an inch. The adult has eight legs.

The tick is a parasite which, in the first stage of its life (four to ten days), lives upon the body of the bird, frequently under the wing, both night and day. After this it will be found in the cracks and crevices of the fowlhouse, only leaving those secluded positions at night to feed upon the bird. It lives by sucking the blood. Unfortunately, the tick at times carries an organism which, during the process of feeding, gains entrance to the blood stream of the bird, causing tick fever, to which the birds readily succumb.

Treatment consists in eradication by spraying the house with some suitable mixture. A 10 per cent. kerosene emulsion has been found to be very effective. Creosote, or some wood-preserving oil, is also most efficient when painted or sprayed on the building. As there is a possibility of seed tick being on the bird at the time of spraying, it is necessary to repeat the process at suitable intervals in order to destroy those that leave their host after the first spraying.

Mites.

There are two classes of mite which cause poultry-raisers trouble in this State. These are commonly known as the red mite and the tropical mite. They are both very minute, and even when fully grown are not much larger than the dot used above the letter "i." They also have eight legs when mature, and when engorged with blood are red, but before feeding are of a greyish colour.

Habits.—The mites live in the cracks and crevices of the poultry-house, and when very numerous are found among the droppings. The red mite feeds on its host at night, seeking seclusion during the day. The tropical mite will feed at any time, and is frequently noticed on birds in the yards during the daytime. Their



PLATE 85.—SEED TICK ATTACHED TO FOWL.

favourite position is among the feathers just above the hock joint. This mite is different in this respect to the red mite. It will also reproduce without leaving the bird. Consequently, the method of eradication of this kind of mite is slightly different from that of the other. Another means of distinguishing between the two mites is that of movement, the tropical mite being the faster of the two, and when a house is infested with tropical mite it is only necessary to place your hand on the nest box, the perch, &c., for a few minutes before it is covered with the pest.

Treatment consists in both cases of spraying. Similar solutions can be used for the mite as for the tick. The sprayings want to be repeated at intervals of about a week until eradication is completed. With tropical mite, it is as well to dip the birds in a solution of Black Leaf 40 at the rate of 1 oz. to the gallon of water. Dipping needs to be done on a day when the birds are not likely to become chilled.

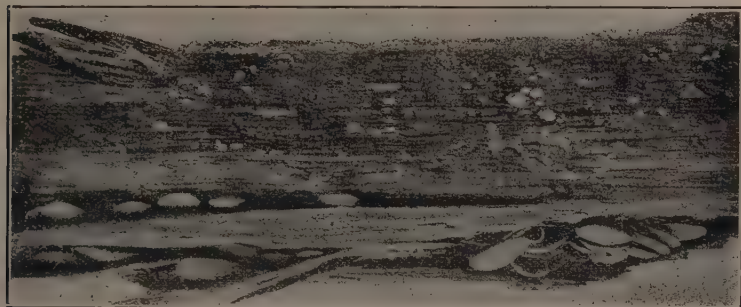


PLATE 86.—PIECE OF OLD SPLINTERED WOOD INFESTED WITH FOWL TICK.

Body Lice.

There are many varieties of body lice. Each species of bird has its own particular variety. With the exception of head lice, unless they are numerous they do not cause any material damage. With head lice, however, young growing birds quickly succumb to the attacks of a few. As the name would indicate, this louse lives around the head and on the higher portions of the neck of the bird. It is a louse of about one-tenth of an inch in length, darkish in colour, and is only noticed at the base of the feather where it enters the skin. On account of the position it occupies, it is difficult to detect and needs to be carefully searched for. On adult stock they appear to cause little ill-effects unless very numerous, and then they appear to be responsible for a form of paralysis.

Treatment.—A dust bath, composed of fine road dust and wood ashes, to which may be added small quantities of flowers of sulphur, tobacco dust, or slacked lime, will be found an efficient means of keeping birds free from body lice when they are penned under more or less intensive conditions. On free range the preparation of a dust bath is not essential, as the fowls find suitable spots for the purpose. With the head louse, it is necessary to catch every chicken affected and lightly smear the feathers around the head and under the beak with olive oil. The fumes from Black Leaf 40 painted on the perch in light quantities no more than half an hour before the birds go to roost is also a most effective means of keeping adult and growing stock free from lice when kept under intensive conditions.

Internal Parasites.

Among the internal parasites there is a variety of round worm varying in length from three-eighths of an inch to 3 inches. The thickness of these worms varies in the like proportion. In Queensland worms of different varieties have been found in the crop, stomach, gizzard, intestines, and the blind gut. In the blind gut will be found the small worm which is probably the most common of the round worms. In addition to the round worm, there are tape worms of many varieties. These vary in size to a greater extent. Some require a hand lens to detect, while others are a foot or more in length. The round worm in the intestines lays its egg, which is voided in the excreta, where it undergoes partial

development. The bird consumes the partly developed egg with particles of food, and on entering the digestive tract it hatches and commences to feed according to its habit, matures, and lays eggs, which are again voided.

The tape worm is made up of a number of segments, and as each segment ripens it is voided with the excreta. This segment contains the pure egg. Flies, slugs, and worms feast on the droppings, taking the eggs into their digestive tracts. Here the egg hatches, the young penetrating the walls of the intestines, encysting itself in the abdominal cavity. The fly, slug, or worm is then eaten by the bird, and an adult tapeworm develops from the encysted stage.

Prevention.—Since the round worm is spread from bird to bird by worm eggs, the following practice should be adopted:—

Never introduce infested stock on to clean premises.

Avoid rearing chickens on land where adult stock have been running.

Have chicken-rearing pens in a position not easily fouled with the washings from adult pens.

Regularly clean poultry houses and pens to reduce the numbers of worm eggs about the premises.

Keep poultry houses and pens as dry as possible.



PLATE 87.—LONG ROUND WORMS (NATURAL SIZE) WHICH WERE REMOVED FROM INTESTINES OF FOWL.

It is seen that tape worms require an intermediary host, and that they feed on the excrement containing segments of the worms. The regular cleansing of poultry houses and yards will reduce to a great extent the possibility of the tape worm coming in contact with the intermediary hosts.

Moist places such as under boards, bags, and feed hoppers are favourable places for slugs and worms to find cover. Therefore, do not have yards littered with such.

Treatment.—No medicament is 100 per cent. efficient, and all treatment needs to go hand in hand with prevention; otherwise birds are freed from a few worms only to be reinfested.

Round Worm.—Any of the following will prove fairly effective, but individual treatment is recommended:—

(1) Mix 1 lb. of tobacco dust with every 50 lb. of mash.

(2) One or two teaspoonfuls, according to age, of equal quantities of medicated turpentine and cotton seed or linseed oil. This is best administered with the aid of a syringe and a piece of rubber tubing. Draw the dose into the syringe. Place the tube down the birds throat until the lower end enters the crop; then eject the mixture. This care is necessary, for if the mixture entered the windpipe it would cause asphyxia.

(3) Capsules containing effective worm medicaments could be obtained.

Tape Worm.—(1) One heaped teaspoonful of powdered pomegranate bark added to the mash for fifty birds.

(2) Ten grains areca nut given in mash for each bird.

(3) Kamala at the rate of fifteen grains in mash.

The above is the dose for adult stock. Half-grown birds should receive half the quantity.

Before administering any worm remedies, the birds should be fasted for twenty-four hours. This is best done by not feeding an evening meal and treating stock the following morning. Follow all treatment in the course of two hours with a dose of salts at the rate of 1 oz. to the gallon of drinking water.

LEG WEAKNESS.

Cause.—Forcing chickens too rapidly, feeding them on an unbalanced ration—a ration lacking in mineral matters or vitamins—or too little direct sunshine will frequently cause this disorder.

Treatment.—Feed a well-balanced ration, supplying vitamins by feeding cod liver oil at the rate of 1 per cent., particularly to chickens reared indoors, a ration containing mineral matter, and give the birds as much exercise as possible. The addition of range and the feeding of milk materially assists in preventing the trouble.

CHICKEN POX.

Cause.—A virus which spreads rapidly from bird to bird through contact or by contamination of the water and food supply. It is a disease that affects all classes of poultry, but it is more pronounced among young stock, being most prevalent during the period November to April. Once stock have been affected they are immune to further attacks.

Treatment.—If only a few birds are affected, they should be isolated and the wart-like growths painted with one of the following:—

(1) Carbolic glycerine: 1 part carbolic acid, 15 parts glycerine.

(2) Five to 10 per cent. solution of iodine.

For flock treatment vaccination is being extensively practised in other parts of the world with highly satisfactory results. Vaccination is especially desirable when the disease occurs annually on a farm, and breeders are recommended to take every opportunity of testing for themselves vaccines placed on the market. At present little has been done in Australia in the preparation of a suitable vaccine.

With an outbreak of this disease, it is as well to keep the system flushed with salts and to feed liberally on green feed. The trouble is also frequently associated with what is commonly known as diphtheritic growths in the mouth. The treatment of these will be dealt with under roup.

DIAGNOSIS OF GENERAL DISEASES IN ADULT STOCK.

There are many troubles to which adult birds are subject, and for the breeder to be unaware of the cause of sickness or the death of a bird occasionally is most undesirable.

In most cases the cause can be ascertained by a careful examination of the bird prior to death or by the conducting of a post-mortem examination. The practice of burning or burying dead birds is highly desirable, but unless the cause is sought prior to such action a breeder may remove the first evidence of what may eventually prove a serious outbreak.

Apart from the actual diseased condition being disclosed, there is the physical aspect to be considered, such as the general condition of the internal organs due to feeding, and also as a means of definitely determining to what extent internal parasites are present.

EXAMINATION OF SICK BIRDS.

In the examination of the sick bird it is as well to commence at the head and examine every part of the body thoroughly, as each portion at times assumes a different condition which may be taken as an indicator of some definite disorder.

The following chart will assist in diagnosis:—

Comb	{	Pale	{ Intestinal parasites ; Lice ; mites ; Hæmorrhage.
		Purple	{ Blackhead ; Faulty circulation ; Faulty respiration.
		Deep red	Botulism.
		Tumors or warts	Chicken pox.
Eyes	{	Watery	Colds.
		Filled with cheesy material	Roup.
		Red and inflamed	Cold.
		Small black specks around	Stick-fast flea.
Face and Wattles	{	Wart-like growths	Chicken pox.
		Pale and sunken	{ Worms ; Mite ; Lice.
Head		Vermin base of feathers	Head lice.
Nostril	{	Clogged with mucous	Colds.
		Same as above ; offensive smell	Roup.
Mouth		Growth on side, roof, and around windpipe	Diphtheritic roup.
Neck	{	Hanging limp	Botulism.
		Wry neck	{ Paralysis, Internal parasites,
Crop	{	Enlarged and hard	Crop-bound.
		Enlarged and soft	Inflammation of crop.
		Content putrid	Botulism
Body		Bluish spots under wings and thighs	Fowl tick.

Abdomen	..	Hard	Internal fat.
		Hard with lump inside	{ Tumor, Internal layer.
		Enlarged and soft	{ Dropsy, Cysts.
Vent	..	Skin around inflamed and feathers soiled	Vent gleet.
		Inflamed material protruding	Prolapse of oviduct.
		Insects around	Lice.
Legs	..	Roughened	Scaly leg.
		Swollen	Gout.
Feet	..	Bottoms and between toes swollen	Bumblefoot.
Feathers	..	Unthrifty appearance	{ Worms, Lice.
		Falling out	Botulism.
Wings	..	Drooping	Parasites and all acute diseases.

[TO BE CONTINUED.]

QUEENSLAND SHOW DATES, 1931.

Taroom: 4th to 6th May.	Kilcoy: 2nd and 3rd July.
Casino, N.S.W.: 5th to 7th May.	Home Hill: 3rd and 4th July.
Boonah: 6th and 7th May.	Townsville: 7th to 9th July.
Mundubbera: 6th and 7th May.	Gatton: 8th and 9th July.
Charleville: 6th and 7th May.	Woodford: 9th and 10th July.
Murgon: 7th to 9th May.	Cleveland: 10th and 11th July.
Longreach: 7th May.	Charters Towers: 15th and 16th July.
Ipswich: 12th to 15th May.	Caboolture: 16th and 17th July.
Mitchell: 13th and 14th May.	Rosewood: 17th and 18th July.
Roma: 19th to 21st May.	Ithaca: 18th July.
Gympie: 20th and 21st May.	Laidley: 22nd and 23rd July.
Emerald: 20th and 21st May.	Nambour: 22nd and 23rd July.
Atherton: 21st and 22nd May.	Esk: 24th and 25th July.
Biggenden: 21st and 22nd May.	Ayr: 24th and 25th July.
Kalbar: 23rd May.	Mount Gravatt: 25th July.
Wallumbilla: 26th and 27th May.	Cairns: 29th and 30th July.
Maryborough: 26th to 28th May.	Maleny: 29th and 30th July.
Bororen: 28th and 29th May.	Bowen: 29th and 30th July.
Toogoolawah: 29th and 30th May.	Royal National: 10th to 15th August.
Marburg: 2nd and 3rd June.	Wynnum: 28th and 29th August.
Childers: 2nd and 3rd June.	Crow's Nest: 26th and 27th August.
Gin Gin: 4th to 6th June.	Imbil: 2nd and 3rd September.
Wowan: 4th and 5th June.	Beenleigh: 18th and 19th September.
Bundaberg: 11th to 13th June.	Malanda: 23rd and 24th September.
Gladstone: 17th and 18th June.	Rocklea: 26th September.
Lowood: 19th and 20th June.	Brisbane River Camp Draft: 25th and 26th September.
Mount Larcom: 19th and 20th June.	Evelyn Tableland: 9th and 10th October.
Rockhampton: 23rd to 27th June.	
Mackay: 30th June to 2nd July.	

PIG SECTION AT THE BRISBANE SHOW, 1931.

In order to provide breeders and exhibitors with up-to-the-minute information in regard to the classes in the Pig Section at the forthcoming Brisbane Royal National Exhibition, a preliminary schedule has recently been issued in leaflet form, and is now available on application to the Secretary at Courier Buildings, Queen street, Brisbane.

The Berkshire and Tamworth breeds are provided each with fourteen classes covering boars and sows at various ages—21 months old and over; 12 months and under 21 months; 8 months and under 12 months; 4 months and under 8 months; and under 4 months. Two classes are provided in these breeds for sows and litters—one a class for sows over 15 months, and a new class for junior sows not over 15 months suckling her own litter of not less than seven pigs, which must not be over ten weeks old. Progeny and group classes are also provided. Liberal provision has been made for Poland-Chinas, Duroc-Jerseys, Gloucester Old Spots, Large and Middle Yorkshires, Large Blacks, and Chester Whites, as well as for pigs suited to the pork and bacon market locally and the export trade in frozen pork. Classes are also to be provided for Wessex Saddleback Pigs.

Altogether the section is an attractive one and liberal prize money is provided in all classes.

Entries close early in July and exhibitors are advised to get in touch with the association as early as possible at Brisbane.

PIGS AND PIG PRODUCTS AT THE ROYAL EASTER SHOW AT SYDNEY, N.S.W.

Prevailing low prices had the effect of reducing the entry of stud pigs at this great Show, but good-quality stock were present, particularly in the Large and Middle Yorkshire, Berkshire, and Tamworth classes. In fact, it is many years since there was such a complete high-quality entry in the Yorkshire classes, while the Berkshires were, with but few exceptions, of a high standard. Considerable interest attended the exhibition of the pigs of British breeding (imported) penned in the Yorkshire classes by Messrs. Edward and Elijah Charlish, of Camden, and in the Berkshire classes of Navua Limited, stud stock breeders, of Grose Wold, Richmond, N.S.W. Of the imported pigs the Large and Middle Whites were the most successful, for in every class they, or their progeny, outrivalled locally bred animals, but in the Berkshire classes locally bred animals secured both male and female championships.

The imported Berkshires are generally somewhat longer in the head and body than those bred here, and this usually results in their appearing rather plain and possibly narrow in comparison with the more blocky type, still approved by many of our judges. That the longer-bodied animals must eventually outpace those of more chubby stature was evidenced in the Middle York classes, where some of the exhibits were too short and fat to attract attention.

The Tamworths were represented by but half a dozen animals, and though these were of good quality the breed suffered considerably by comparison. No other pure breeds were penned, and the pork and bacon pig classes were not as liberally supported as is desirable.

Mr. Shelton, of the Queensland Department of Agriculture and Stock, judged the Yorkshires, Mr. G. A. Bedwell the Berkshires, Mr. A. F. Gray the Tamworths, and Mr. John McLean the pork and bacon classes.

The Hams and Bacon Section was well filled and entries were to hand from most of the principal factories in New South Wales, including the Queensland Bacon Association. Meat cured under what is tentatively called the "new cure" was much in evidence and created interest, for it is much brighter in colour and is milder than the more matured meat that has been popular in the shows in recent years. Some of the meat shown was overfat and the comparison between overfat flitches and hams carrying insufficient fat was marked, the judge (Mr. A. E. Sweaney, of Inverell, N.S.W.) commenting on this fact, and recommending exhibitors to select their show bacon from sides that are generally heavier than is desirable for local trade. The taste to-day is for a very mild, bright-coloured, fleshy bacon and ham, and brands carrying these desirable features are more popular than the heavier grades that do not hold their colour so well and that carry more than the desirable quantity of fat.

On the whole, both the Pig Section and the classes devoted to hams, bacon, and lard were of an attractive nature and added their quota to the educational nature of this great livestock fair.



PLATE 88 (Fig. 1).

Champion Large Yorkshire Boar, Sydney Show, 1931. "Wall King David 14th" (imp.) 953. Exhibited by Elijah Charlish, of Camden, N.S.W. Note characteristic shape and type. This boar scaled over 700 lb. live weight, and was not overfat.



PLATE 89 (Fig. 2).

Champion Middle Yorkshire Boar, Sydney Show, 1931. "Norfolk Nobleman" 3993. A boar, the progeny of imported stock, whose type and quality was much admired. Note difference in type to the Large Yorkshire as shown in fig. 1. Exhibited by Elijah Charlish of Camden.



PLATE 90 (Fig. 3).

Champion Berkshire Boar, Sydney Show, 1931. "Wilmot Marquis" 9643. Exhibited by Navua Ltd., of Grose Wold, N.S.W. A boar whose breeding and quality is undoubted, and who comes from a long list of prize-winning stock.



PLATE 91 (Fig. 4).

Champion Berkshire Sow, Sydney Show, 1931. "Danesboro Reconstructress" 9052. Also exhibited by Navua Ltd., whose success in the Berkshire section was a feature of the Show. This sow's breeding traces back on both sides to imported blood of a superior type.



PLATE 92.—MEMBERS OF THE FARM BOYS' CAMP AT THE ROYAL EASTER SHOW, SYDNEY, 1931.

The group includes ten Queensland lads, of whom six are seated in the front of the group; two of the Club organizers, Mr. T. Porter, of the Queensland Department of Public Instruction, and Mr. W. Blacklock, Assistant to Mr. E. Buckwell, who has charge of the Junior Farmers' Movement in New South Wales. The New South Wales boys were, with one or two exceptions, older than the Queensland lads. All spent a very happy and profitable time as guests of the Royal Agricultural Society of New South Wales.

POTATO MOTH.

By A. PERSON, Senior Inspector, Diseases in Plants Act.

FUMIGATION TEST.

On the 3rd January, 1931, a fumigation test was made by fumigating potatoes affected with potato moth larvæ. A charge of 3½ oz. of carbon bisulphide was placed in the Departmental Chamber of 210 cubic feet capacity, and the affected potatoes left in for forty-eight hours. On examination after fumigation the grubs were alive and appeared not to be affected in any way.

A second charge of 7 oz. was placed in the same chamber for the same period, and a fresh lot of infested tubers treated, and with fatal results. The larvæ on examination, although some distance in the tubers, were dead in every case examined, and had turned a brownish colour all over the body.

A further batch was again tested in the same chamber with 5 oz. of carbon bisulphide, and although the grubs were tunnelled some distance into the tubers, the results proved fatal to them.

A germination test was made with three of these tubers fumigated with 5 oz. of carbon bisulphide. They were set under wet bags on the 2nd February, and to-day had developed excellent shoots, proving that the carbon bisulphide had not affected the eyes for germination purposes.

PIGMENTATION OF MILK AND MILK PRODUCTS.

Milk contains two classes of pigments, the fat soluble and the water soluble. Among the former carotinoids only are found, and of these carotin predominates. This pigment (carotin) characterises the adipose tissue and skin secretion of dairy cattle, especially Jersey and Guernsey breeds.

There is a striking difference between the various breeds of dairy cattle with respect to the amount of carotin incorporated in the butter fat. Guernsey and Jersey rank first, with the Ayrshire, Shorthorn, Holstein, and other breeds lower in the scale.

These differences are relative, and sometimes when no carotin is present in the food the milk fat of all breeds becomes almost colourless. The colour of butter often persists longer on carotin-free feeds in the case of Guernsey and Jersey breeds. The fact that the adipose tissue of these breeds is also highly coloured with carotin has given rise to the idea of a storage of pigment to explain a greater persistence of pigmentation when no carotin is fed.

Pumpkins and squashes contain carotinoids, and when fed to hogs produce a good flavour in the meat which, however, may obtain an undesirable yellow colour.—CHAS. McGRATH, Supervisor of Dairying.

JUGULAR VEIN INJECTIONS.

A SAFE AND CONVENIENT METHOD.

By F. R. THOMPSON, Stock Experiment Station, Yeerongpilly.

This simple method of injecting sterile solutions into the jugular vein devised and successfully employed by the writer in the treatment of bovines with trypan-blue and trypanflavin against tick fever is devoid of danger and is efficacious.

Appliances.

Glass separatory funnel fitted with glass stopper and glass tap, capacity 200 cc.; 10 inches of good rubber tubing to connect funnel to canula; tourniquet of strong cord about 4 feet by ¼ inch; trocar and canula for bleeding.

Sterilisation of Appliances.

Boil the solution to be injected for ten minutes in a suitable vessel, boil also the trocar and canula, rubber tubing, and separatory funnel. Pour solution into funnel, replacing stopper with cotton wool plug. Disinfect the tourniquet by immersing in disinfectant, viz., Hycol, Ival, &c.

Procedure.

Animal in standing position, crush, stall, or bail, and secure. Animal down, place full stretch on side, head back, neck resting on block of wood or brick. Thoroughly disinfect neck with suitable disinfectant solution. Place tourniquet in position round neck, take up tight and make secure with quick release knot; extra tension by twitching may be necessary. Insert trocar-canula into swollen vein (above the cord on head side) directed towards the body (the way the blood flows to the heart), secure good flow, withdraw trocar, connect canula to funnel with rubber tubing; open tap, allow blood to flow into and mix with solution in the funnel, thus repelling all air in tubing, funnel apparatus and contents to be in upright position; release tourniquet and the contents of the funnel will now run back into the vein. Finally withdraw canula and disinfect the neck.

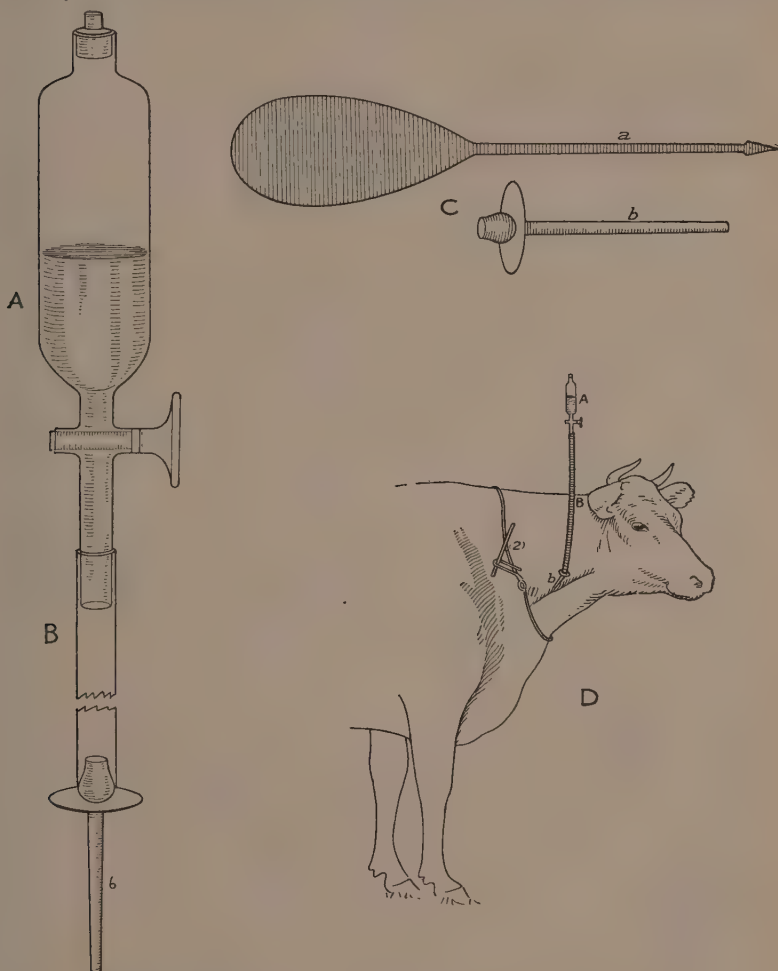


PLATE 93.

A. Separatory funnel.

B. Connecting rubber tubing.

C. Trocar (a), Canula (b).

D. Animal showing the apparatus in use—(1) Tourniquet, (2) twitch stick.

The Young Farmer.

HIGH GRADE MILK.

By CHAS. McGRATH, Supervisor of Dairying.

MILK is a natural human food containing in a readily digestible form all essential food elements, while milk products constitute an important part of the food of mankind.

Milk readily absorbs odours and flavours and is attacked by bacteria.

Through bacterial activity milk undergoes rapid changes which affect its quality and general character.

The milk in the udder of the cow in normal health is practically free from micro-organisms.

Under careful conditions pertaining to its production, it is impossible to keep milk entirely free from micro-organisms. Hygienic conditions pertaining to the production and handling of milk ensure a product having a low bacterial content, and possessing good keeping qualities.

It can be generally stated that the change in the bacterial content of milk during the first few hours after it is drawn from the udder of the cow is dependent upon the initial bacterial count. The initial bacterial count is directly influenced by—

(1) The health of the producing cow—i.e., that each cow is in normal health; that there is no mammary trouble, such as inflammatory condition of the udder—e.g., mammitis (mastitis).

(2) The condition pertaining to the production and handling of the milk. Efficiency in this section has an important bearing on the number and species of the bacteria introduced into the milk. The chief sources of infection being:—

- (a) The coat, udder, and teats of the cow;
- (b) The hands and clothes of the milker;
- (c) The dust from the air in the milking-shed and place where milk is treated.
- (d) The condition of the milking machine, dairy plant, and utensils that come in contact with the milk.

Attention must be given to—

- (a) The clipping off of all long hairs from the flanks and udder when the cow first flushed and the cleansing of the flanks, udder, and teats of the cow, the hands and apparel of the milkers and other operatives.
- (b) The cleansing and near sterilisation of the milking plant and the renewal of the rubber parts as required. The cleansing and near sterilisation of all dairy utensils that the milk comes in contact with.
- (c) It should be borne in mind that the less milk is brought in contact with the apparatus the less the source of infection.
- (d) The milking shed and dairy buildings should be constructed on hygienic lines and kept in a condition to allow of the production of milk under sanitary conditions.

(3) Time elapsing from production to treatment or consumption of the milk.

The period for which milk will remain in a sweet, wholesome state is dependent upon the initial bacterial count, and the conditions under which it is held.

Temperature.

The temperature at which milk is held exercises a direct influence on its keeping quality.

Efficient cooling checks development and multiplication of the bacteria in the milk, but by higher temperatures certain undesirable types of bacteria gain the upper hand.

It is advisable where milk is to be despatched to a factory or milk plant or is intended for human consumption, that it be cooled as soon as possible after it is drawn from the cow to a temperature preferably below 40 deg. Fahr.

The cooling should be carried out in a clean, sanitary place and in pure air.

Straining.

Effective straining is secured by passing the milk through specially prepared cotton wool.

The straining is ineffective to improve the bacterial content of the milk. In its production, handling, and delivery, every precaution must be taken to prevent dust, and particles of dirt, with adhering bacteria, from gaining access to the milk. Methodical hygienic conditions are associated with the production of milk, with a low initial bacterial content, resulting in a high-grade product.

STOCK FOOD MEALS.**Meat Meal.**

Meat meal is a packing house by-product, prepared from meat scrap generally (such as is not suitable for use in the preparation of small goods, sausages, &c.). This scrap meat is cooked under steam pressure until the fat is removed, after which the product is desiccated or ground up, dried, and sold under various trade names, including digester tankage (an American term) and various grades of meat meal. When mixed with blood it is known as meat and blood meal, and when incorporated with ground bone is styled blood and bone meal. Most of the meat meals used in Australia carry from 50 to 60 per cent. crude protein, and as their content of ground bone is high, they carry a good mineral and a liberal fat content. This meat meal is a valuable addition to the list of foods available, though it must always be looked upon as a condiment more than as an actual food, for if pigs were fed entirely upon meat meal they would suffer severe internal disorders and make unsatisfactory growth. A common mixture would be, say, milk, maize, and meat meal; or maize and meat meal, if milk is not available.

It is the animal protein in meat meal that stimulates the appetite, builds up bone and muscle, and encourages a healthy, vigorous development, in addition to reducing the amount of grain (maize, &c.) necessary to produce pork. In some overseas experiments the addition of meat meal to the rations of pigs weighing 60 lb. reduced the corn allowance by 4 lb. per day, a substantial amount and one worth consideration.

As is the case with most of the protein foods, they are more valuable in the feeding of young pigs and of sows in pig than of mature stock, while it is also more valuable in the absence of skim milk, butter milk, or whey than where these by-products of the dairy are used. Similarly, if there is a liberal supply of green lucerne, field peas, or other nitrogenous foods, less meat meal will suffice.

Details of the analysis and price of typical samples of meat meal may be obtained on application to manufacturers or departmental experts at any time.

Blood Meal.

In general, in Australia, blood meal is not utilised as a stock food to the same extent as in America, for here it is usual to mix the blood with bone meal and sell it under the trade name of blood and bone meal, a well and favorably known garden fertilizer. Blood, of course, also enters into the composition of meat meal, while in the "make up" of a number of concentrated calf meals, dog biscuits, and other preparations for stock this product is utilised in limited quantities. It carries a very high protein content (as high as 80 per cent.), and is, of course, comparatively expensive.

As a direct food it is not advised, for apart from being unpalatable it is too rich and too highly concentrated, and would cause serious digestive disturbances if used as the principal item in any stock ration.

It has medicinal values and has been used with success in severe cases of bowel disorders. Some authorities even say that a few handfuls of blood meal fed to a suckling sow is usually effective in stopping scours in her litter, but, as indicated, even when used for this purpose care must be exercised, otherwise indigestion and gastric disorders will follow. It has a value in calf feeding if used judiciously. Ordinarily, of course, strictly limited amounts of boiled blood may be mixed in with other pig foods and be utilised, but this only applies to the small amounts that are occasionally available when a beast or a pig is killed for home consumption.

The excessive of any meat product in the feeding of pigs is not advised.

Fish Meal.

Though not usually available as a stock food on the Australian markets, fish meal is recognised overseas as a valuable addition to the list of concentrated foods available for farm stock. It is usually prepared by fish paste manufacturers and by packers of dried or tinned fish, and like meat meal, &c., has a place in all feeding systems. In some instances where fish oil is the principal product of manufacture the fish meal resulting from grinding of the residue from the oil factory carries a higher percentage of oil than is the case where fish scrap from small fish is used. A popular make of fish meal in America is known as Menhaden or fish meal, prepared from the by-products of herring packing works. There are two or three grades of fish meal, one known as white fish meal being preferred for pig or stock feeding; white fish meal carries more flesh and less fat than yellowish coloured meals. A point stressed is that fish meal is usually credited with having a liberal content of potassium iodide or iodine; an addition of value for stock feeding purposes. It is claimed that the use of iodine rich foods results in stronger and more vigorous suckers being produced; and the sow's milk flow is strengthened in proportion to the allowance of iodine rich foods she receives.

In general, the use of fish meal is not advocated by pork butchers or bacon curers, but, of course, they object to an excess of any risky foods in the preparation of pigs for the bacon, pork, or frozen pork trade.

We have not had much experience in Australia in the use of fish meal as a stock food, largely because meat meal, protein meal, linseed oil meal, &c., have been given more prominence. Then, again, the fish business has not been developed in Australia to anything like the same extent as abroad. Fish meal must be looked upon with a certain amount of suspicion where it is recommended as a food for pigs.

CURING BACON AT HOME.

THE carcass of a pig, after hanging over night to cool, is laid on a strong bench or stool and the head is separated from the body at the neck close behind the ears. The feet and also the internal fat, kidneys, &c., are removed. The carcass is next divided into two sides in the following manner:—A deep cut is made with the knife the whole length of the back from tail to neck on either side of the backbone, which is removed by sawing the ribs from each side.

The pig thus cut up is ready for being salted in the following way:—

Dry Curing.

(1) Take fine salt 25 lb., brown sugar 2½ lb., saltpetre 1 lb. Mix well together.

For the first three or four days the above mixture should be well rubbed in over the fleshy parts and around the bones and joints. Afterwards, spread the mixture freely each day. The sides should be stacked so that the sides on top one day will be at the bottom the following day, and leave for upwards of three weeks away from the flies.

If there is reason to doubt the keeping quality of the bacon, stick in a knitting needle to the bone (shoulder or ham), draw it out, and if an odour clings to it it will indicate whether the bacon is good or not.

Pickling.

(2) Take clean rainwater 10 gallons, fine dry salt 25 lb., brown sugar 2½ lb., saltpetre ½ lb., salt prunnella ¼ lb., allspice ½ lb. Dissolve the above ingredients in the water, then put in the allspice tied up in a bag. Boil for upwards of an hour and remove all scum as it rises to the top. Allow the solution to cool before use. The above quantity is sufficient for 200 lb. of meat.

The strength of pickle should be closely watched. Its density should be 90 to 95 on the salinometer.

Before immersing the sides in the pickle they should be rubbed with salt for a day or so. This will tend to purge the meat of all blood, &c.

After salting and pickling the flesh is brushed and then washed in rain water and soaked in a solution made by dissolving ½ lb. of bicarbonate of soda in 10 gallons of clean rain water. Again wash with clean rain water.

Twenty-one days should be sufficient time for pickling—hams require four to five weeks, according to size.

The next thing is drying. This should be done away from flies and dust in a moderately warm room. Care must be taken that the sides are evenly dried and firm all over.

Finally, remove to smokehouse and smoke to taste. Hang the sides shoulder up and finish by rubbing the skin over with olive oil.

THE CARE OF THE CAR.

CARBURETTER ADJUSTMENT

PETROL and air mixed are really the engine's food, and the carburetter, together with the intake manifold, is a combination cook oven and water, inasmuch as the petrol and air are correctly mixed in the carburetter, then warmed, and finally delivered to the correct cylinder. It is an unfortunate fact that most popular makes of carburetters differ considerably in their appearance and in the details of their adjustments. However, almost all carburetters are the same in principle, so that if the principle is described the reader should be able to check his own carburetter.

For satisfactory combustion the air and petrol must be very intimately mixed and at the same time the petrol must be vaporised before it is burned. The air and petrol are intimately mixed within the carburetter in much the same manner as air and liquid are mixed in the average fruit spray. Within the carburetter there is a restricted passage through which air is sucked by the engine. This restricted passage is known as the throat of the carburetter. In the throat of the carburetter the petrol jet or jets are situated. These jets are so arranged that the rushing of the air past the jet causes the petrol to be sucked out of them in the form of a very fine fog. The level of the petrol in the jets is maintained by the action of the float chamber, the float and needle valve of which ensure that the chamber is always filled to a definite level. This level is usually arranged so that it is about $\frac{1}{8}$ inch below the level of the top of the jets. When a carburetter is found to lose petrol over the top of the jets while the engine is standing then the float chamber is adjusting the level incorrectly.

Between the carburetter and the manifold the throttle valve is placed. The throttle valve is usually a simple rotating disc within the round pipe, so arranged that it practically seals off the pipe when the accelerator is released and completely opens the pipe when the accelerator is fully depressed.

Usually a special idling jet is provided and this jet is so arranged that when the throttle is closed a small current of air passes it and conveys a comparatively rich mixture to the carburetter for idling purposes.

Many carburetters are fitted with an auxiliary air valve so arranged that as the engine is speeded up and the suction in the carburetter increased the auxiliary valve will open and allow more air into the carburetter. This is done because, as the suction becomes greater, the carburetter tends to feed too rich a mixture, which must be broken down by the addition of more air.

Most engines have a hot spot fixed on the pipe between the carburetter and the intake manifold. This hot spot is a jacket around the pipe which is usually located by exhaust gases, but sometimes by hot-water from the cooling system. The purpose of this hot spot is to make sure that the petrol is actually vaporised. Liquid petrol will not burn. In cold weather it is possible to put out a burning match by throwing it into an open tin of petrol, as when the petrol is cold it does not give off inflammable vapour. When the petrol is drawn from the carburetter jets it is in the form of a very fine fog or mist. That is, air mixed with very small particles of liquid petrol just the same as fog is air mixed with very small particles of liquid—water—not water vapour, as water vapour is invisible. The small particles of liquid petrol must be converted into petrol vapour and the heating at the hot spot causes these particles to vapourise.

To get the maximum economy from the engines working the mixture supply must be correctly proportioned.

Rich Mixture.

Many motorists operate their cars with too rich a mixture because an over-rich mixture makes the engine more tractable at low speeds. For this reason rich mixture is known as "lazy-man's" mixture. Not only does rich mixture waste petrol, but it has a deleterious effect upon the engine, as the excess petrol dilutes the lubricating oil, causing the oil to lose its efficiency and thus promoting wear. Also rich mixture causes an excessive deposit of carbon in the engine, as all the carbon in the fuel cannot be burned when the air content of the mixture is inadequate.

The carburetter should first be adjusted by adjusting the idling screw to get the engine to idle slowly. Most carburetters have a mixture adjustment, although some carburetters have set jets and to make any adjustment the size of jet must be changed.

When a mixture adjustment is fitted the mixture should be weakened until the point is reached where the sudden opening of the throttle causes the engine to "cough" or "pop back" before it picks up speed. At this point the mixture is a little too weak and should be strengthened a little. The mixture is always too rich when any weakening of the mixture tends to make the engine speed increase. The final test of the carburettor adjustment is to run the car on the road and check the petrol consumption. The carburettor should never be adjusted while the engine is cold, as if that be done the mixture is sure to be too rich when the car warms up. The judicious use of the choke when warming the engine up will take care of the engine's tendency to stall.

The choke or strangler is a device on the carburettor to enable the driver to procure a rich mixture for starting purposes. This is effected either by opening up the adjustable jet, as is done in the Stewart carburettor, or by shutting out most of the air with a choke or strangler valve, as is done in most other carburettors. The choke should always be used with care when warming up a cold engine, as by its injudicious use it is possible to flood the engine with practically raw petrol. It is much better to have the engine stall rather than to feed it an excessively rich mixture. When a car is fitted with an extra air attachment, petrol may be saved by opening the extra air on every down grade when coasting is not resorted to.

Another not unusual cause of petrol wastage is the repeated acceleration movements caused by rough roads and the foot resting on the accelerator. The accelerator should have a strong spring so that it can be held in one position continuously when desired.

There is a new line of carburettors on the market which have a petrol pump operated by the sudden movement of the accelerator. The idea of this pump is to force extra petrol into the intake when the accelerator is suddenly jammed down. This device gives rapid acceleration, but if the accelerator is oscillated during ordinary driving will cause considerable waste.—"RADIATOR," in the "Farmer and Settler."

FERTILIZER TRIALS AT ELIMBAH.

By H. BARNES, Instructor in Fruit Culture, Brisbane.

PINEAPPLE PLOT.

Drainage.

The underground tile drain laid down last September has proved a complete success during the recent wet weather. During the exceptionally wet periods in February and March it was running at full pressure, and, with the exception of a day or two days during the fine weather about the beginning of March, there has been a continuous smaller flow since the commencement of the wet season.

It may be interesting to record here that the average output of a 3-inch drain is quoted as 3,600 gallons per hour, so that the benefits to be derived by plants growing in a badly drained soil may be readily reckoned when drains are used as a means of quickly reducing the water level in the soil.

The appearance of the plot has greatly improved since the wet weather, and, with the exception of rows Nos. 7 and 14, the plants generally have a good colour. Much of the long spindly growth mentioned in the last report as growing in some rows has disappeared, and stronger growth is evident. Plants from which fruit has been cut are throwing out good strong suckers.

The soil in rows 8 and 12 was subject to calcium cyanide treatment for nematodes prior to the setting out of the plants. For some time after planting the plants showed very poor results, but now, however, they are growing well and are much improved and bigger. This tends to the belief that calcium cyanide applied to soil has the effect of retarding growth somewhat in the first instance. Row No. 2—to which sulphate of ammonia only was applied—holds the premier position so far as general appearance and even growth are concerned. Row No. 7—to which sulphate of potash only was applied—is a poor colour though possessing strong plants. The fruit on Row No. 4—which received blood alone—is very backward, being at least three weeks behind most other rows.

The applications of the fertilizer mixtures set out in the following table were made in April and October, 1930:—

PLOT—FOURTEEN DOUBLE ROWS, 9 FT. (CENTRE TO CENTRE) APART, 50 YARDS IN LENGTH.

Row No.	Nauru Phos.	Sulp. Amm.	Sulp. Potash.	Blood.	Basic Super.	Bone.	Previous Remarks.	Present Condition.
	Lb.	Lb. Check	Lb. Row	Lb.	Lb.	Lb.		
1	..	..	..	..	..	..	Fairly strong plants; pale colour; growth fair. Number of fruit, 119.	Growth and colour fair.
2	15	10	10	..	..	..	Good even growth; colour very good and best in plot. Plants somewhat small though growing well and showing benefit of change over from Nauru alone. Number of fruit, 21.	Best row on appearance; fairly strong plants; colour very good and growth very uniform.
*3	24	..	..	14	..	..	Sturdy plants; growth fair; pale foliage. Best row for fruit, 136.	Good strong row; colour improved.
4	..	..	..	20	..	..	Growth variable; some long narrow swordleaf growth; colour fair; Fruit, 79.	Growth variable and inclined to be soft. Fruit about three weeks behind other rows.
5	..	10	16	10	..	..	Growth very uneven; spindly narrow leaves; colour fair. Fruit, 52.	Much improved; strong growth and good colour.
*6	..	10	10	..	15	..	Paper mulched; growth improved; colour good, somewhat uneven growth. Fruit, 52.	Growth further improved; colour good.
7	..	..	20	..	..	..	Good strong even growth; foliage very pale. Fruit, 88.	Strong even row; foliage pale. Fruit inclined to be rather smaller in size.
8	..	..	18	18	..	..	Fair growth; some spindly plants; colour generally good, though variable condition of plants. Fruit, 77.	Growth and colour improved; new growth inclined to be soft; average fruit larger than other rows.
†9	16	..	18	14	..	..	Sturdy plants and good growth; colour fair. Fruit, 116.	Good growth though variable; colour fair.
10	..	..	20	18	10	..	Growth variable; fair to good; long narrow swordleaf foliage. Fruit, 74.	Growth fair to good; colour variable.
11	..	18	20	..	10	..	Colour slightly better than 10, and growth similar. Fruit, 49.	Growth improved; colour fair to good.
*12	..	..	20	16	..	14	Fairly strong growth; colour good; growth uneven. Fruit, 74.	Growth improved; colour good. Fruit early and of good size.
13	..	†10	†30	..	..	..	Weak growth; colour good. Fruit, 77.	Growth improving; colour good.
14	..	Check	Row	..	..	..	Poor. Fruit, 40.	Poor.

* Paper Mulched.

† Applied in April.

‡ Applied in October.

THE EFFICIENCY OF THE AUSTRALIAN WORKER.

Mr. S. McKay, chairman of directors, H. V. McKay Pty. Ltd., Sunshine, Victoria, on his return from a trip overseas, said: "Other countries have their worries, but they do not proclaim them to the world as we do. Australia is certainly passing through a very difficult period, but she can make a good recovery. She has wonderful powers of recuperation. She has been suffering from dry conditions and general depression, but so have other countries. The experience in Australia, however, has shown that good seasons invariably follow bad. Australia possesses the right quality of materials, her steel, leather, and timber, particularly if the last-named be properly seasoned, more than meet the requirements for the manufacture of harvesters, as far as quality is concerned. Australian workmen are efficient, skilful, and hard-working, notwithstanding what some people have said to the contrary. There is no finer workman than the Australian, and, moreover, he possesses initiative. I would not change my staff at Sunshine for any staff that I have seen in America."

Answers to Correspondents.

BOTANY.

The following answers have been selected from the outgoing mail of the Government Botanist, Mr. C. T. White, F.L.S.:—

Tick Trefoil.

R. W. R. (Byrnestown)—

The specimen of clover-like plant you send is a species of Tick Trefoil or Desmodium, and we should say is *Desmodium triflorum*, though your specimen bears neither flowers nor fruits. This plant is a very useful one in the pasture, but grows close to the ground. Seed is not stocked by nurserymen, but once you have the plant growing on your property we should say it would be spread naturally by stock.

Noogoora Burr.

W. M. B. (Toowoomba)—

Noogoora Burr is looked upon as poisonous only in the very young stages—that is, just after the seeds have germinated. The older plants are regarded as being quite harmless. However, if chaffed or cut up there is always the danger of the burrs causing mechanical injury.

Northern Shade Trees.

J. J. C. (Feluga, N.Q.)—

A good tree for your purpose would be the Phytolacca or Bella Sombra Tree (*Phytolacca dioica*). We do not know that this is usually stocked by nurserymen, but seeds could be obtained from Mr. R. Dick, Purga, via Ipswich, at 2s. per large packet. The tree has the advantage that it is an exceptionally rapid grower and that stock are quite fond of the leaves. Other trees that should also do well with you and are worth planting for shade purposes are Weeping Fig, Rain Tree (*Pithecolobium saman*), Terninalia, and Calophyllum. All these should be obtainable from the Botanic Gardens, Townsville, or from Mr. Gulliver, nurseryman, Hyde Park, Townsville. If not in stock by them, then we think you could certainly get plants from the Curator, Botanic Gardens, Rockhampton. The common mango is a tree not to be despised as a shade and ornamental tree. If you intend to grow it, we think you will find it advisable to plant the seeds in the place intended for their permanent site.

Prickly Poppy. Thorn Apple. Variegated Thistle.

J. H. McC. (Dalby)—

1. *Argemone mexicana*. Prickly Poppy. This plant is generally regarded as being poisonous to stock, though practically always neglected by them. The only cases that have actually come under our notice have been where the plants have been cut and allowed to wilt and stock have subsequently eaten the cut, wilted, and naturally softened plants.
2. *Datura ferox*.—A species of Thorn Apple or "Stranunium." This plant is one of the most poisonous we possess, but, generally speaking, is avoided by stock, the only cases that have come under our notice of poisoning by Daturas in Queensland being where the plants have been growing in cultivation and have been chaffed up with the crop, particularly lucerne.
3. *Silybum Marianum*. The Variegated Thistle. Stock eat large quantities of this plant without any ill-effects following, but it is supposed at times to develop a prussic acid yielding glucoside, when, of course, it would be poisonous. So far as we know, however, the presence of the glucoside has not been proved, and the specimens you send were altogether too decomposed to hand over to the Agricultural Chemist for the purpose of chemical analysis.

Cassia Fistula.

N. G. B. (Toogoolawah)—

From leaf only we should say the plant is *Cassia fistula*, the Golden Shower or Indian Laburnum, largely planted in coastal Queensland as an ornamental tree. We should imagine, however, that conditions at Toogoolawah are rather cold for it. It is essentially a tropical tree and grows very well in the neighbourhood of Cairns, producing there long pods known as Cascara Beans. These, however, are not the source of the Cascara of commerce, which comes from the bark of a North American tree. The plant is a species of senna, and the pulp surrounding the seeds is largely used in North Queensland as a mild and safe purgative.

Noogoora and Bathurst Burrs.

C. (Toowong)—

Noogoora Burr is botanically *Xanthium pungens*, and is supposed to have first made its appearance in Queensland at Noogoora Station, Queensland, hence the local name. It is supposed to have arrived with cotton seed from America in the early 'sixties of last century. By 1879 it was recorded that 500 acres of Noogoora Station were overrun with the pest. From this beginning the plant has spread, practically speaking, throughout the whole of the State, except, perhaps, the very far west, mainly along rivers and alluvial flats.

The Bathurst Burr is *Xanthium spinosum*. It owes its common name to its having been first brought prominently to notice at Bathurst in New South Wales. Mr. J. H. Maiden, late Government Botanist of New South Wales, writing on the plant, said that it was originally introduced into South Wales, he thought, first at Twofold Bay in the tails of horses from Valparaiso, Chili, South America, in the 'forties of the last century. He further states that at Bathurst it was first noticed not many years afterwards on the site of the Old Black Bull Inn, corner of Bentinck and Howick streets.

Honey Locust.

T. L. (Brisbane)—

The thorny tree of which you left a specimen is *Gleditsia triacanthus*, the Honey Locust of North America. It is a handsome tree; the strap-like pods contain a sweetish pulp, and are freely eaten by stock. The tree is planted a good deal on the Darling Downs. We had one tree in the Botanic Gardens some years ago, but it died out owing to borer attack, to which the tree is rather subject.

Monkey Pod.

C. (New Farm)—

The botanical name is *Pithecolobium grandiflorum* and the tree is a native of the scrubs of coastal Queensland and northern New South Wales. It is well worthy of cultivation, being handsome either in flower or pods. The name *Pithecolobium* comes from two Greek words signifying Monkey and Ear-ring, due to the peculiar coiled, ring-like character of the pods before they open. The species are commonly known as Monkey Pod.

Orange Splitting.

"Pensioner". (Charters Towers)—

The Director of Fruit Culture, Mr. Geo. Williams, advises as follows:—The variety of the orange tree cannot be determined from your description, but would be included in the following:—Navel, Oonshii, or Mediterranean Sweet—most likely the latter. The splitting of the fruit is not confined to one variety. It is largely due to fluctuations of temperature and rainfall. An even supply of moisture throughout the growing season is most desirable. Usually splitting of the fruit is much less pronounced in aged than in young trees.

General Notes.

Correction.

There was an obvious error, due to the misreading of a shorthand note, in the legend under Plate 74, "A Farmer's Flock in New Zealand," on page 238 of the April issue (Part IV., vol. xxxv.) of the Journal. In the second line the word "lamb" should be substituted for "ram," on the third line "lamb" should also be substituted for "sire" and the words "fat lamb" before the last word "trade" should be omitted. The corrected legend should read:—The male progeny of this fine mob of Southdown ewes will be mated with long-wool ewes (mostly Romney Marsh). The ultimate resultant lamb from this cross is considered, in parts of New Zealand, to be the right type of lamb for the trade.

Water Hyacinth and Yams as Food for Pigs.

A reader living in the far north of Queensland writes that he finds his breeding sows and other pigs like the water hyacinth plants. He has used it for breeding sows and they do fairly well on it along with other feed; in fact, during a spell of short supply of other foods the pigs got practically nothing else. It was fed raw, and they ate the tops, leaves, roots and all. They also eat the stalks and roots of the flat-leaved water lily which they appear to relish.

Another plant called the Bulgaroo grows very well in the swamps of the North, as also yams of which there are many varieties. Specimens of yams on view recently were about three times the size of a well grown sweet potato. Thousands of wild pigs live and do well on these foods on many of the swampy islands and swampy areas along the coast of Queensland and in the swamps in the western areas.

Atherton Tableland Maize Board.

Following are the results of the recent election of five growers' representatives on the Atherton Tableland Maize Board:—

William Bailey (Atherton)	..	..	..	..	185 votes.
Edward Hall (Tolga)	..	..	..	..	177 "
John Francis Quilter (Tolga)	..	..	..	..	170 "
Robert Hill (Atherton)	..	..	..	..	167 "
Thomas William Bray (Yungaburra)	..	..	..	..	163 "
John Gargan (Atherton)	..	..	..	..	153 "

The successful candidates will be appointed for a term of one year as from the 1st April.

In pursuance of the provisions of "*The Primary Producers' Organisation and Marketing Acts, 1926 to 1930*," Mr. William Bailey has been appointed Chairman of the Atherton Tableland Maize Board from 1st April, 1931, to 31st March, 1932.

Powers of Cane Pests Boards.

A regulation has been issued under the Sugar Experiment Stations Acts empowering Cane Pests Boards to deal effectively with pests on private lands. It provides that a Board may serve a notice upon the occupier or owner of any infested land in its area requiring him to take within a certain time specified measures for the eradication of the cane pests on his land. If he fails to comply with such notice in the stated time he shall be liable to a penalty of £20, and any member or agent of the Board may, with such servants and assistants as thought desirable, enter upon the land and take the measures defined in the notice served upon the owner. Any expenses incurred by the Board in doing this may be recovered from the owner or occupier in any court of competent jurisdiction.

Lactating Dairy Cattle Need Plenty of Water.

The water consumption of ten lactating cows was measured by means of meters on the individual drinking cups over a period of four months. The water meters were read daily. The cows produced an average of 44 lb. of milk daily and drank on the average 16½ gallons of water.

On this basis each cow drank 3.4 lb. of water for each pound of milk produced.

As the average daily temperature increased, the consumption of water increased and vice versa.—Extract from Michigan Sta. Quart. Bulletin 1930.

Barley Board.

Messrs. Henry Kessler (Cambooya), Edward Fitzgerald (Felton East), and E. Graham (Director of Marketing), have been appointed members of the Barley Board as from the 24th April, 1931, to the 23rd April, 1932.

Honey Board.

The election of four growers' representatives on the Honey Board for a period of two years as from the 16th April, resulted as follows:—

	Votes.
Roy John Bestmann, Caboolture	218*
Charles William Edwards, Greenbank, via Kingston ..	212*
Alexander Roy Brown, Park Ridge	206*
George Herbert Whiting, Coowoonga	187*
Robert Victor Woodrow, Woodford	115
Henry Edgar Fagg, South Killarney	107
Owen Norman Tanner, Samford	105
John Schutt, Perthton, via Dalby	72
Frederick William Bentick, Stanthorpe	62

* Elected.

Arrowroot Board.

The referendum to decide whether arrowroot flour should be placed under the control of the Arrowroot Board resulted as follows:—

For	93 votes.
Against	35 votes.

The election of five growers' representatives on the Arrowroot Board resulted as follows:—

	Votes.
James Francis Cassidy, Woongoolba	70
Carl Brumm, Woongoolba	69
Gottlieb Christian Sempf, Norwell	67
Alexander Rose, Norwell	66
Robert Stewart, Ormeau	64
Benjamin George Peachey, Ormeau	61
Johann Friedrich Wilhelm Sultmann, Woongoolba ..	58
Leslie Roberts Oxenford, Oxenford	56
Morrison Clark, Pimpama	52
Ernst Traugott Zipf, Woongoolba	50
Hermann Wilhelm Koppen, Woongoolba	46
Peter Skopp, Woongoolba	25
George Rawlinson Walker, Upper Coomera	25

Messrs. Cassidy, Brumm, Sempf, Rose, and Stewart are therefore eligible for appointment for a term of three years as from the 15th April, 1931.

Extending Citrus Levy Regulations.

A regulation has been issued under the Fruit Marketing Organisation Acts making provision for the extension for a further twelve months of the Citrus Levy Regulations.

These regulations are similar to the previous ones, with the exception of an alteration in the amount of levy on the bushel cases, this being altered from 1½d. to 1¼d. per case, and will operate in respect of citrus fruits marketed for the period as from 1st March, 1931, to 28th February, 1932.

The levy shall be payable by the growers of citrus fruit at the rate of 1¼d. per bushel case and ¾d. per half-bushel case, and 5s. a ton shall be payable on all citrus sent to fruit canners, fruit preservers, jam or pulp manufacturers, or juice extractors. The levy shall be collected by levy stamps obtainable from the Head Office of the Committee of Direction, Brisbane, and which are affixed to account sales, &c. This entitles the agent to deduct the value of the levy from moneys held to the credit of the growers concerned.

The levy will be expended in the interests of the citrus fruit growing industry of Queensland and in advertising in the interests of the growers.

Butter Board.

The Governor in Council has approved of the issue of an Order in Council giving notice of intention to extend the operations of the Queensland Butter Board from 1st July, 1931, to 30th June, 1934.

Any petition for a poll to decide whether the operations of the pool shall be continued must be signed by at least 10 per cent. of the suppliers of cream to the butter factories mentioned below, and also the butter factories themselves. The petition must reach the Minister not later than 5 p.m. on the 18th May, 1931.

Nominations are also called for election for three years as growers' representatives on the Board.

The Board shall consist of six elected representatives of the growers and the Director of Marketing, and will hold office from the 1st July, 1931, to the 30th June, 1934.

Each of the undermentioned Divisions of the State shall elect one representative:—

Division No. 1 comprising the Butter Factories at Malanda (2), Julatten, Daintree, Ravenshoe, Millaa Millaa, and Silkwood.

Division No. 2 comprising the Butter Factories at Bundaberg, Wowan, Rockhampton (2), Gladstone, Monto, and Mackay.

Division No. 3 comprising the Butter Factories at Gayndah, Biggenden, Kingaroy, Maryborough, Wondai, Nanango, and Murgon.

Division No. 4 comprising the Butter Factories at Chinchilla, Clifton, Dalby, Miles, Toowoomba, Crow's Nest, Goombungee, Oakey, and Roma.

Division No. 5 comprising the Butter Factories at Esk, Killarney, North Ipswich, Ipswich, Gatton, Booral, Boonah, Grantham, Laidley, Allora, Goondiwindi, Mill Hill, and Texas.

Division No. 6 comprising the Butter Factories at Caboolture, Pomona, Eumundi, Dayboro', Kin Kin, Beaudesert, Maleny, Kingston, Woodford, Cooroy, and Gympie.

Nominations will be received by the Under Secretary, Department of Agriculture and Stock, Brisbane, until 5 p.m. on the 18th May, 1931, for election as growers' representatives. Each nomination must be signed by at least ten cream suppliers in the Division concerned.

In order to ensure their names being on the roll of persons eligible to vote on any matters in connection with the proposed Board, cream suppliers to factories mentioned are invited to send their names and addresses to Mr. A. H. Jones, Returning Officer, Department of Agriculture and Stock, Brisbane. Full particulars will be found in the "Government Gazette" of the 18th April, 1931.

Codling Moth Control.

William Cooper and Nephews (Australia) Limited write, under date 5th January, 1931:—

In the October number of the "Queensland Agricultural Journal," on page 454, under the heading "Codling Moth Control," you publish an article relating to tests carried out by the Horticultural Division of the Victorian Department of Agriculture, in which you refer at some length to "Volek" and the results obtained with that particular product.

May we draw your attention to the fact that this article is merely an extract from the official report, and refers to only one of the products used. Several other oils and arsenates were also used in these tests, amongst them being "Alboleum" and "Arsinette," which are manufactured in Australia, and we enclose copy of that portion of the report dealing with the tests with "Alboleum."

You will notice that only five sprays were necessary with this Australian product as against six with most of the others, and that the results in this case were 98.8 per cent. of clean fruit, which figure was not exceeded by any other spray or combination of sprays. You will also notice that no spreader was used with this combination, which was apparently necessary in the case of the imported article.

We merely wish to draw your attention to this matter as we feel sure that you would like, if it is possible, to give some prominence to an Australian made article which has been proved to be equally as effective as the imported, and, as stated before, we refer you to the July issue of the "Victorian Agricultural Journal," which gives a full report of all these sprayings.

Staff Changes and Appointments.

The appointments of Messrs. J. C. Wilson (Wamuran) and B. Funnell (Dayboro') as Agents under the Banana Industry Protection Act have been confirmed as from 11th September, 1930.

Mr. J. H. Gregory, Instructor in Fruit Packing, has been appointed also an Inspector under the Diseases in Plants Acts.

Mr. L. M. Hodge, Manager, Cotton Research Station, Biloela, has been appointed also an Inspector of Stock.

Mr. F. A. L. Jardine, Inspector, Diseases in Plants Act, Stanthorpe, has been appointed also an Inspector of Stock in the same district.

The Officers in Charge of Police at Kingaroy and Wondai have been appointed inspectors under the Brands Act as from the 18th April, 1931.

Mr. H. A. McDonald, Inspector of Stock, Kingaroy, has been appointed also an Inspector under the Slaughtering and Brands Acts, as from the 18th April, 1931.

Mr. Simmonds's Oversea Tour.

The Minister for Agriculture and Stock (Mr. Harry F. Walker) announced recently that Mr. J. H. Simmonds, of the staff of the Division of Entomology and Plant Pathology, had been granted leave of absence to enable him to visit important plant pathological stations in America, Europe, and Asia. In the course of his overseas mission Mr. Simmonds will have opportunities of investigating certain diseases which are identical with or closely allied to serious local sources of loss to rural industries in Queensland. He will, for instance, break his journey in Hawaii, and while there will devote practically the whole of his time to a study of pineapple diseases. In California he will have an excellent opportunity of discussing the latest developments in citrus diseases, and the same will apply with respect to pathological problems of cotton in the Southern United States. Attention will also be devoted to maize problems further north. In England further opportunities will be available for the discussion of pathological problems with some of the world's leading plant pathologists. On his return Mr. Simmonds will break his journey in Ceylon, the Federated Malay States, and Java, where attention will be devoted to the diseases of the various tropical crops produced in these countries.

Mr. Simmonds will be absent from Australia for a period of ten months, and the Minister feels sure that agriculturists will be interested to know that, although Mr. Simmonds is on a private trip, many of their pathological problems will be securing the benefit of discussion with prominent overseas scientists.

Crutching of Sheep.

Crutching usually takes place about midway between shearings, and is therefore considered to be of some value as a preventive of blowfly infestation, as the fly does not operate so freely when the wool is short. With ewes in lamb crutching is usually performed about six weeks before lambing, the object being to clear away all wool from the hindquarters and over the udder, so that at lambing time there will be less attraction for the blowfly, and in order to make it easier for the young lamb when suckling its mother.

Maiden ewes and ewe weaners also require careful crutching, and the whole ewe portion of the flock is usually crutched at the one time. The crutching of ewes should extend well above the tail, taking in all the inner britch and, as stated above, in the case of lambing ewes, the area close to the udder.

Unless the fly is particularly bad, writes the Sheep and Wool Expert of the New South Wales Department of Agriculture, the only time it is necessary to crutch the wethers is when, owing to change of feed or other causes, they become scoured, in which case the soiled wool should be removed. When crutching wethers, therefore, only the wool immediately below the tail will be removed apart from the usual "ringing."

All sheep which are heavily woolled on the head should at this time be wigged. If this is neglected, such sheep cannot easily see their way about and may injure themselves against timber or fences. There is greater danger also of grass-seed entering the eye when a sheep is very woolly on the face.

Some sheepowners do not consider crutching necessary, but because of the cleaner appearance of the sheep and the absence of trouble with daggy wool at shearing, the operation is recommended, even though the fly may not be active.

The Home and the Garden.

OUR BABIES.

Under this heading a series of short articles by the Medical and Nursing Staff of the Queensland Baby Clinics, dealing with the welfare and care of babies, has been planned in the hope of maintaining their health, increasing their happiness, and decreasing the number of avoidable cases of infant mortality.

MORE ABOUT MILK.

THERE are many ways of giving milk to children. One of the best is to drink plain milk out of a cup. Sometimes children take it more readily if slightly sweetened or flavoured with a little cocoa or postum. Others prefer junket, or milk jelly or custard or milky puddings. Do not make these too sweet. Give them with stewed fruit. If this is not available, a spoonful of jam is a great help. Of course, milk will be taken with porridge or breakfast food. Bread and milk is wholesome, if children prefer their milk this way. If all mothers would take these wholesome milk foods, their children would be asking for them. A good example is better than much persuasion. The want of milk in a child's diet is more serious than most diseases. We may recover from disease; from want of milk during childhood we never recover.

Sour Milk.

There are two sorts of sour milk—bad sour milk and good sour milk. Bad sour milk is the ordinary sort produced by the growth of all sorts of bacteria. It is nasty and unwholesome. To make good sour milk you must procure a "starter" either from a butter factory or a laboratory. Scald your milk to kill nearly all its contained bacteria, let it cool to blood heat, add the "starter," and it will go nicely sour in twelve to twenty-four hours according to the temperature. In winter you may have to keep the milk warm. When it is sufficiently sour, you can stop the process by heating it. You need the "starter" only once. A teaspoonful of your own sour milk will start next day's milk.

Children at first do not like good sour milk, but if persuaded to take it they become very fond of it within a few days. It has the flavour of fresh cream cheese. A little sugar helps.

Some of the most vigorous and hardy races of men live largely or even chiefly on sour milk. It is a misfortune that we have forgotten how good and nice and wholesome it is.

Dried Milk.

Of late years we have had dried milks of much better quality than formerly. They are the best substitutes for good fresh milk when this is unprocurable, and as substitutes they have been very valuable.

Dried Skimmed Milk.

From this all the cream has been removed. It has, therefore, to be marked "unfit for infants." Although not a complete food, it contains all the constituents of milk except the butter, and being cheap should be a valuable substitute for fresh milk in our Western districts. It is not recommended for babies, but for children over two, for it makes very nice milk puddings. Always add butter in making puddings with dried skimmed milk.

Condensed Milk.

This is milk partly evaporated and preserved by the addition of a large quantity of sugar. About half of it is sugar, partly milk-sugar, but mostly cane sugar. For this reason it is a very poor substitute for fresh milk.

Butter.

This is the fat of milk and contains the vitamins A and D. It is a wholesome, valuable, and concentrated food. Children take it readily, and it is easy to give them too much. They then lose their appetites, probably also their tempers, pass putty coloured motions, and lose weight.

Cheese.

This is the valuable proteid of milk together with some of the fat. When given to children it should always be grated, and then makes delicious meals cooked with rice, macaroni, or cauliflower. Do not give too much.

TOMATO SEED SELECTION.

In selecting tomatoes from which seed is to be saved, only that from the best yielding plants which conform strictly to the characteristics of the variety, both as regards type of vine and type of fruit, should be chosen. Several fruit should be cut open to be sure of the quality. A plant should be chosen that produces a large number of average size tomatoes rather than a plant with two or three large fruits and a number of small ones. Care should be taken to see that the plant is free from disease, as several tomato diseases are transmitted by the seeds.

The best method of separating tomato seed from the surrounding pulp is as follows:—Cut the fruit in halves and scoop the contents into a bucket, and when the latter is about half full, fill up with water. Stand the bucket aside and allow the contents to ferment, which will take from two to six days, according to the warmth of the weather. A froth forms on top of the water when fermentation is sufficiently advanced. Wash the contents of the bucket on a fine sieve or a layer of hessian and the pulp will come right away from the seed, which must be spread out in a thin layer to dry. Rapid drying is important to prevent moulding. When dry, rub the seed in the hands to separate the individual seeds. Seed harvested in this manner has averaged 94 per cent. germination.

As already indicated, selection from a plant which is free from disease is important, but as a further precaution the seeds should be dipped for ten minutes in a solution of mercuric chloride, 1 part in 1,000 parts of water, before planting. Proper precautions must be taken with mercuric chloride where there are children or animals, as it is highly poisonous if taken internally.

THE FARM VEGETABLE GARDEN.

The question of drainage should be considered in relation to all classes of soil, but especially in relation to those that are at all heavy. Neglect to make the necessary provision on such soils explains many failures to get good results from them during the winter months. Now is the time to think of the question of treatment.

Briefly, the objects of drainage are (1) to enable as much water as possible to percolate through the soil, and (2) to prevent the lodgment and stagnation of water on the soil surface by enabling excess quantities of water to be carried away with ease. It is especially necessary, of course, to drain clay soils. If water is allowed to remain on these for long they tend to "puddle," but if the water is drained away the soil does not become so compacted, retaining, instead, a more friable (crumbly) and porous condition.

Drainage may be of two kinds—surface or underground; the latter is the more effective, but it entails more labour and expense. A simple surface drainage scheme consists of shallow trenches running between plot and pathway, and connected up to an outlet at a suitable point. A modified form of surface drainage is expressed in a system of raised beds. Where some form of drainage is necessary, and the installation of the underground system is impossible, either of these methods is to be commended.

Underground drainage necessitates a considerable amount of trench digging. On what plan it is advisable to set out the drains will depend upon the size and contour of the area. In some cases a herring-bone design may be applicable, the main trench forming the backbone, so to speak, and running through the lowest portion of the land and the smaller contributory trenches spreading upward from this. In other cases it may only be necessary to feed the main trench from one side, while in others again main trenches may best be laid at the edges of the area and fed from the centre. These trenches may then be partially filled with

broken stones, and the surface of the filling protected with a layer of tin or brushwood, so that the earth with which it is subsequently overlaid may not drop through and destroy the porous character of the filling.

A drain provided with this rubble filling is usually the most convenient to make, and is quite effective; but a roughly-built conduit or channel may take the place of the broken stones if desired. This may be made of flat stones or bricks, or (failing either of these) of boards. Only the sides and top need be formed of these materials, the trench floor serving for the bottom. The stones or bricks, or whatever is used, should only be loosely laid together, so that water may fall into the trench through them and be carried off. In country gardens, where saplings are easily available, these may be used effectively in the bottom of the trench (say a foot deep), covered by a 6-inch layer of brushwood.

The depth at which the drain should lie will depend upon the class of soil, but, needless to say, it should be sufficiently deep to allow of cultivation above it. If there is difficulty in arranging this the scheme should be so adjusted that the drain runs underneath the garden pathways, and not under the beds proper; 2 ft. 6 in. to 3 ft. is usually a satisfactory depth at which to lay a drain in the ordinary household plot.

There is little necessity for drainage on sandy soils, but gardeners working on land of a heavier character should set to work now to repair any deficiency in this direction. If the contour of the plot is regular it is not necessary to do the work all at once. As a section of the plot becomes vacant opportunity may be taken to carry out drainage work on it prior to preparing it for another planting. Then, when each section of the garden has been dealt with, the scheme can be connected up.—A. and P. Notes, N.S.W. Department of Agriculture.

KITCHEN GARDEN.

Cabbage, cauliflower, and lettuce may be planted out as they become large enough. Plant asparagus and rhubarb in well-prepared beds in rows. In planting rhubarb it will probably be found more profitable to buy the crowns than to grow them from seed, and the same remark applies to asparagus.

Sow cabbage, red cabbage, peas, lettuce, broad beans, carrots, radish, turnip, beet, leeks, and herbs of various kinds, such as sage, thyme, mint, &c. Eschalots, if ready, may be transplanted; and in cool districts horse radish can be set out.

The earlier sowings of all root crops should now be ready to thin out, if this has not been already attended to.

Keep down the weeds among the growing crops by a free use of the hoe and cultivator.

The weather is generally dry at this time of the year, so the more thorough the cultivation the better for the crops.

Tomatoes intended to be planted out when the weather gets warmer may be sown towards the end of the month in a frame where the young plants will be protected from frost.

FLOWER GARDEN.

No time is now to be lost, for many kinds of plants need to be planted out early to have the opportunity of rooting and gathering strength in the cool, moist spring-time to prepare them for the trial of heat they must endure later on. Do not put your labour on poor soil. Raise only the best varieties of plants in the garden; it costs no more to raise good varieties than poor ones. Prune closely all the hybrid perpetual roses; and tie up, without pruning, to trellis or stakes the climbing and tea-scented varieties, if not already done. These and other shrubs may still be planted. See where a new tree or shrub can be planted; get these in position; then they will give you abundance of spring bloom. Renovate and make lawns, and plant all kinds of edging. Finish all pruning. Divide the roots of chrysanthemums, perennial phlox, and all other hardy clumps; and cuttings of all the summer bedding plants may be propagated.

Sow first lots, in small quantities, of hardy and half-hardy annuals, biennials, and perennials, some of which are better raised in boxes and transplanted into the open ground. Many of this class can, however, be successfully raised in the open if the weather is favourable. Antirrhinum, carnation, picotees, dianthus, hollyhock,

larkspur, pansy, petunia, *Phlox Drummondii*, stocks, wallflower, and zinnias, &c., may be sown either in boxes or open beds. Mignonette is best sown where it is intended to remain. Dahlia roots may be taken up and placed in a shady situation out of doors, plant bulbs such as anemones, ranunculus, frezias, snowflakes, ixias, watsonias, iris, narcissus, daffodil, &c. The Queensland climate is not suitable for tulips.

To grow these plants successfully it is only necessary to thoroughly dig the ground over to a depth of not less than 12 inches, and incorporate with it a good dressing of well-decayed manure, which is most effectively done by a second digging; the surface should be raked over smoothly so as to remove all stones and clods, thus reducing it to a fine tilth. The seed can then be sown in lines or patches as desired, the greatest care being taken not to cover deeply; a covering of not more than three times the diameter of larger seeds, and a light sprinkling of fine soil over small seeds, being all that is necessary. A slight mulching of well-decayed manure and a watering with a fine-rosed can will complete the operation. If the weather prove favourable, the young seedlings will usually make their appearance in a week or ten days; thin out so as to leave the plants (if in the border) at least 4 to 6 inches apart.

A REMINDER TO ONION GROWERS.

Onion seed growers should, by this, have gone through their selected onions with the object of picking out the best keepers for the production of seed. The bulk of these onions should have been selected, previous to storing, for early maturity and variety characteristics. At the final selection bulbs that are soft or prematurely shooting, or those showing any indication of being bad keepers, or that are diseased, should be discarded.

The bulbs should be planted in rows at least 3 feet apart and spaced 2 feet apart in the rows. A handy position well protected from the boisterous winter winds should be selected for the growing of onion seed.

Farm Notes for June.

FIELD.—Winter has set in, and frosts will already have been experienced in some of the more exposed districts of the Maranoa and Darling Downs. Hence insect pests will to a great extent cease from troubling, and weeds will also be no serious drawback to cultivation. Wheat sowing should now be in full swing, and in connection with this important operation should be emphasised the necessity of at all times treating seed wheat by means of fungicides prior to sowing. Full directions for "pickling" wheat by copper carbonate treatment are available on application to the Department of Agriculture, Brisbane. Land intended for the production of early summer crops may now receive its preliminary preparation, and every opportunity taken advantage of to conserve moisture in the form of rainfall where experienced; more particularly so where it is intended to plant potatoes or early maize. Where frosts are not to be feared the planting of potatoes may take place in mid-July; but August is the recognised month for this operation. Arrowroot will be nearly ready for digging, but we would not advise taking up the bulbs until the frosts of July have occurred. Take up sweet potatoes, yams, and ginger. Should there be a heavy crop, and consequently a glut in the market, sweet potatoes may be kept by storing them under cover and in a cool place in dry sand, taking care that they are thoroughly ripe before digging. The ripeness may be known by the milky juice of a broken tuber remaining white when dry. Should the juice turn dark, the potato is unripe, and will rot or dry up and shrivel in the sand pit. Before pitting, spread the tubers out in a dry barn, or in the open if the weather be fine. In pitting them or storing them in hills, lay them on a thick layer of sand; then pour dry sand over them till all the crevices are filled and a layer of sand is formed above them; then put down another layer of tubers, and repeat the process until the hill is of the requisite size, and finally cover with either straw or fresh hay. The sand excludes the air, and the potatoes will keep right through the winter. In tropical Queensland the bulk of the coffee crop should be off by the end of July. Yams may be unearthed. Sugar-cane cutting may be commenced. Keep the cultivator moving amongst the pineapples. Gather all ripe bananas.

Cotton crops are now fast approaching the final stage of harvesting. Growers are advised that all bales and bags should be legibly branded with the owners' initials. In this matter the consignor is usually most careless, causing much delay and trouble in identifying parcels, which are frequently received minus address labels.

Orchard Notes for June.

THE COASTAL DISTRICTS.

The remarks that have appeared in these notes for the past two months apply in a great measure to June as well, as the advice that has been given regarding the handling, grading, packing, and marketing of the citrus crop still holds good. As the weather gets cooler the losses due to the ravages of fruit flies decrease, as these insects cannot stand cold weather, and consequently there is only an odd one about. The absence of flies does not, however, permit of any relaxation in the care that must be taken with the fruit, even though there may be many less injured fruit, owing to the absence of fruit-fly puncture, as there is always a percentage of damaged fruit which is liable to speck, which must be picked out from all consignments before they are sent to the Southern States if a satisfactory return is to be expected. If the weather is dry, citrus orchards must be kept in a good state of tilth, otherwise the trees may get a setback. Old worn-out trees can be dug out and burnt; be sure, however, to see that they *are* worn out, as many an old and apparently useless tree can be brought round and made to bear good crops, provided the trunk and main roots are still sound, even though the top of the tree is more or less dead. The whole of the top of the tree should be cut off and only the trunk and such sound main limbs left as are required to make a new head. The earth should be taken away from around the collar of the tree, and the main roots exposed, any dead roots being cut away and removed. The whole of the tree above ground and the main roots should then be dressed with a strong lime sulphur wash or Bordeaux paste. The main roots should be exposed for some time, not opened up and filled in at once. Young orchards can be set out now, provided the ground is in good order. Don't make the mistake of planting the trees in improperly prepared land—it is far better to wait till the land is ready, and you can rest assured it will pay to do so in the long run.

When planting, see that the centre of the hole is slightly higher than the sides, so that the roots, when spread out, will have a downward, not an upward, tendency; set the tree at as nearly as possible the same depth as it was when growing in the nursery, cut off all broken or bruised roots, and spread those that remain evenly, and cover them with fine top soil. If the land is dry the tree should then be given a good watering, and when the water has soaked in the hole can be filled up with dry soil. This is far better than watering the tree after the soil has been placed round it and the hole filled up. Custard apples will be ripening more slowly as the nights get colder. If the weather becomes unduly cold, or if immature fruit is sent South, the fruit is apt to turn black and be of no value. This can easily be overcome by subjecting the fruit to artificial heat, as is done in the case of bananas, during the cooler part of the year, when it will ripen up properly and develop its flavour. Grade custard apples carefully, and pack in cases holding a single layer of fruit only for the Southern markets.

Pineapples, when at all likely to be injured by frost, should be protected by a thin covering of bush hay or similar material. The plantation should be kept well worked and free from weeds, and slow-acting manure, such as bonedust or island phosphates, can be applied now. Lime can also be applied when necessary. The fruit takes longer to mature at this time of the year, consequently it can be allowed to remain on the plant till partly coloured before gathering for the Southern markets, or can be fully coloured for local use.

Banana plantations must be kept worked and free from weeds, especially if the weather is dry, as a severe check to the plants now means small fruit later on. Bananas should be allowed to become full before the fruit is cut, as they will carry all right at this time of the year; in fact, there is more danger of their being injured by cold when passing through New England by train than there is of their ripening up too quickly.

Bear in mind the advice given with regard to the handling, grading, and packing of the fruit. It will pay you to do so. Land intended for planting with bananas or pineapples during the spring should be got ready now.

Strawberries require constant attention, and, unless there is a regular and abundant rainfall, they should be watered regularly. In fact, in normal seasons an adequate supply of water is essential, as the plants soon suffer from dry weather or strong, cold westerly winds. Where not already done, vineyards should be cleaned up ready for pruning—it is however, too early to prune or to plant out new vineyards.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

All kinds of deciduous fruit trees are now ready for pruning, and this is the principal work of the month in the orchards of the Granite Belt area. Don't be frightened to thin out young trees properly, or to cut back hard—many good trees are ruined by insufficient or bad pruning during the first three years. If you do not know how to prune, do not touch your trees, but get practical advice and instructions from one or other of the Departmental officers stationed in the district. In old orchards do not have too much bearing wood; cut out severely, especially in the case of peaches, or you are likely to get a quantity of small unsaleable fruit. There are far too many useless and unprofitable fruit trees in the Granite Belt area, which are nothing more or less than breeding-grounds for pests, such as fruit fly, and are a menace to the district. Now is the time to get rid of them. If such trees are old and worn out, take them out and burn them, but if they are still vigorous, cut all the tops off and work them over with better varieties in the coming season—apples by grafting in spring and peaches and other stone fruits by budding on to young growth in summer. Planting can start now, where the land is ready and the trees are to hand, as early planted trees become well established before spring, and thus get a good start. Be very careful what you plant. Stick to varieties of proved merit, and few at that, and give so-called novelties and inferior sorts a wide berth. Take the advice of old growers, and do not waste time experimenting with sorts that have probably been tested in the district and turned down years ago. When land is intended for planting this season, see that it is well prepared and well sweetened before the trees are put in, as young trees seldom make a good start when planted in sour and badly prepared land.

Slowly acting manures—such as bonedust, meatworks manure, or island phosphates—can be applied now, as they are not liable to be washed out of the soil, and they will be available for the use of the trees when they start growth in spring. Lime can also be applied where required. Badly drained land should be attended to, as no fruit trees will thrive with stagnant water lying round their roots.

On the Downs and Tableland all kinds of fruit trees can be pruned now, and vines can be pruned also in any district where there is no danger from late frosts, and where this can be done the prunings should be gathered and burnt, and the vineyard ploughed up and well worked to reduce the soil to a good state of tilth, so that should rain come it will absorb all that falls and the moisture can be kept in the soil by cultivation subsequently.

Citrus fruits will be at their best in the Western districts. The trees should be watered if they show signs of distress, otherwise all that is necessary is to keep the surface of the land well worked. All main-crop lemons should be cut by this time, as, if allowed to remain longer on the tree, they only become overgrown and are more suitable for the manufacture of peel, whereas if cut and cased now they will keep in good order so that they can be used during the hot weather.

SOLIDS IN MILK.

Total solids in milk increase as the lactation period advances and a material increase takes place towards the end of the period coincident with a decrease in the quantity of milk produced.

Milk fat + casein = 50 per cent. of the total solids of the milk.

Fat + casein + lactose (milk sugar) = 88 to 90 per cent. of the total solids of milk.

Since the fat and casein increases as the lactation period advances and the milk sugar remains constant, it is only to be expected that the total solids of milk would increase as the lactation period advances.

The total solids in milk are influenced (in addition to the period of lactation) by other factors, such as the individuality, the age, breed, health, and treatment of the cow and intervals between successive milkings.

The food supply and seasonal changes influence the amount of total solids in milk to the greatest extent.

Where cows are dependent on pasture lands for their food the weather conditions have an important influence on the total solids in milk.

In a favourable season when the cows have a plentiful supply of green succulent feed the total solids in the milk increase, while during a dry period when green succulent feed is not available for the dairy herd the total solids of the milk produced decrease.—CHAS. McGRATH, Supervisor of Dairying.

ASTRONOMICAL DATA FOR QUEENSLAND.

Times Computed by D. EGLINTON, F.R.A.S., and A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

MOONRISE.

Date.	May, 1931.		June, 1931.		May, 1931.		June, 1931.	
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6.21	5.17	6.39	5.0	p.m. 4.33	p.m. 5.25		
2	6.22	5.16	6.39	5.0	5.11	6.23		
3	6.23	5.16	6.40	5.0	5.47	7.22		
4	6.23	5.15	6.40	5.0	6.43	8.21		
5	6.24	5.15	6.40	5.0	7.40	9.19		
6	6.24	5.14	6.41	4.59	8.38	10.17		
7	6.25	5.13	6.42	4.59	9.37	11.11		
8	6.25	5.13	6.42	4.59	10.34	...		
9	6.26	5.12	6.42	4.59	11.31	12.3		
10	6.26	5.11	6.43	4.59	...	12.57		
11	6.27	5.10	6.43	4.59	12.27	1.48		
12	6.28	5.9	6.43	4.59	1.21	2.40		
13	6.28	5.8	6.43	4.59	2.12	3.35		
14	6.29	5.7	6.44	5.0	3.3	4.36		
15	6.29	5.7	6.44	5.0	3.54	5.36		
16	6.30	5.6	6.44	5.0	4.49	6.37		
17	6.30	5.6	6.45	5.0	5.49	7.38		
18	6.31	5.5	6.45	5.0	6.48	8.36		
19	6.32	5.5	6.45	5.0	7.49	9.28		
20	6.32	5.4	6.46	5.0	8.48	10.14		
21	6.33	5.4	6.46	5.0	9.47	10.49		
22	6.34	5.4	6.46	5.0	10.43	11.25		
23	6.35	5.3	6.46	5.0	11.33	11.58		
24	6.35	5.3	6.47	5.1	12.14	12.31		
25	6.36	5.2	6.47	5.1	12.49	1.6		
26	6.36	5.2	6.47	5.1	1.24	1.43		
27	6.37	5.1	6.47	5.2	1.56	2.25		
28	6.37	5.1	6.47	5.2	2.29	3.14		
29	6.37	5.1	6.47	5.3	3.6	4.11		
30	6.38	5.0	6.47	5.3	3.45	5.9		
31	6.38	5.0	...	...	4.32	...		

Phases of the Moon, Occultations, &c.

3 May.	○ Full Moon	3 14 p.m.
9 "	☾ Last Quarter	10 48 p.m.
18 "	● New Moon	1 27 a.m.
25 "	☾ First Quarter	5 38 a.m.

Apogee, 12th May, at 11.18 a.m.
Perigee, 28th May, at 2.18 a.m.

At Warwick Mercury will rise 5 minutes before the Sun on the 1st, and one hour and 33 minutes before it on the 15th.

Venus will rise at 3.46 a.m. on the 1st, and at 4.4 a.m. on the 15th.

Mars will rise at 12.57 p.m., and set at 11.31 p.m. on the 1st; on the 15th it will rise at 12.21 p.m. and set at 11.13 p.m.

Jupiter will rise at 11.24 a.m. and set at 9.46 p.m. on the 1st; on the 15th it will rise at 11.27 a.m. and set at 8.47 p.m.

Saturn will rise at 10.13 p.m. and set at 11.47 a.m. on the 1st; on the 15th it will rise at 9.16 p.m. and set at 10.50 a.m.

The Southern Cross will reach its highest point and be in an upright position at 10 p.m. near the beginning of the month. It will then be due south, and its height above the horizon will be 58 degrees at Warwick, nearly two-thirds of the distance from the horizon to the zenith.

1 June	○ Full Moon	12 33 a.m.
8 "	☾ Last Quarter	4 18 p.m.
16 "	● New Moon	1 1 p.m.
23 "	☾ First Quarter	10 23 a.m.
30 "	○ Full Moon	10 46 a.m.

Perigee, 9th June, at 5.54 a.m.
Apogee, 22nd June, at 11 a.m.

Before daybreak on 4th June, Saturn will be five degrees northward of the Moon when nearly full, and both will be high overhead, but in a north-westerly direction, Saturn having passed the meridian about three hours earlier.

About 8 p.m. on the 16th the planets Mars and Neptune will be apparently separated from one another by a distance equal to the diameter of the Moon. They will appear to be amongst the stars of Leo, nearly four degrees or eight diameters of the moon to the eastward of Regulus, the brightest star in the handle of the sickle. In the absence of the Moon, which being new will set with the Sun, a favourable opportunity to find Neptune will be afforded to observers who have a telescope or binoculars.

On the 18th, about 3 p.m., observers may find it interesting to look for the Moon and Jupiter, which will be in the north-north-west. The Moon in sickle shape will be rather more than half-way from the zenith to the northern horizon. Jupiter, five degrees higher, will require telescope or binoculars on account of its position with regard to the Sun. Three days later Mars will be only two degrees south of the Moon, about 3 p.m., but the distance from the Sun will be considerably further to the eastward.

On the 29th, Mercury will be passing from west to east of the Sun on the far side of its orbit. Though presenting its full face to the Earth and one degree above it, the planet will be entirely lost in the Sun's bright rays.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhat about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

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